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IN THE

Supreme Court of the United States

OCTOBER TERM, 1997

STAFF SERGEANT MICHAEL W. BUSH,
PETITIONER

v.

UNITED STATES OF AMERICA, RESPONDENT

On Petition For a Writ of Certiorari to the United States Court of Appeals for the Armed Force

Petition For a Writ of Certiorari to the United States Court of Appeals for the Armed Forces

PETITION FOR WRIT OF CERTIORARI

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QUESTIONS PRESENTED

I

Whether the petitioner was denied his Fourth Amendment right to be secure in his person, against unreasonable searches and seizures when the search authorization (warrant) for his hair did not satisfy the probable-cause and specificity requirements of the Fourth Amendment.

II

Whether the petitioner was denied his Fifth Amendment right to due process when the military judge erred to the substantial prejudice of the appellant by denying the defense motion to disallow the introduction of testimony concerning the results of the hair analysis test conducted on the petitioner's hair, since the test was not a reliable procedure as implemented.

TABLE OF CONTENTS

Page

QUESTIONS PRESENTED i

TABLE OF AUTHORITIES ..... v-viii

OPINIONS BELOW 1

JURISDICTION 1

CONSTITUTIONAL PROVISIONS INVOLVED 1

STATEMENT OF THE CASE 2

REASON FOR GRANTING THE WRIT 7, 14

I

THE PETITIONER WAS DENIED HIS FOURTH AMENDMENT RIGHT TO BE SECURE IN HIS PERSON, AGAINST UNREASONABLE SEARCHES AND SEIZURES WHEN THE SEARCH AUTHORIZATION (WARRANT) FOR HIS HAIR DID NOT SATISFY THE PROBABLE-CAUSE AND SPECIFICITY REQUIREMENTS OF THE FOURTH AMENDMENT.

II

THE PETITIONER WAS DENIED HIS FIFTH AMENDMENT RIGHT TO DUE PROCESS WHEN THE MILITARY JUDGE ERRED TO THE SUBSTANTIAL PREJUDICE OF THE APPELLANT BY DENYING THE DEFENSE MOTION TO DISALLOW THE INTRODUCTION OF TESTIMONY CONCERNING THE RESULTS OF THE HAIR ANALYSIS TEST CONDUCTED ON THE PETITIONER'S HAIR, SINCE THE

TEST WAS NOT A RELIABLE PROCEDURE AS IMPLEMENTED.

CONCLUSION. 35

APPENDIX A (Opinion of the United States Court of Appeals for the Armed Forces). 1a

APPENDIX B (Opinion of the United States Air Force Court of Criminal Appeals) 23a

TABLE OF AUTHORITIES

Page

Supreme Court Cases:

Daubert v. Merrell Dow Pharmaceuticals,
113 S.Ct. 2786 (1993) 17, 19, 20, 25, 26, 28, 33-35

Franks v. Delaware, 438 U.S. 154 (1978) 9, 10

Illinois v. Gates, 462 U.S. 213 (1983) 8

Ornelas v. United States, — U.S. —,
116 S.Ct. 1657 (1996) 3

United States v. Leon, 468 U.S. 897 (1984) 8, 13

Federal Circuit Cases:

Cella v. United States, 998 F.2d. 418
(7th Cir. 1993) 17, 18

United States v. Foote, 898 F.2d. 659
(8th Cir. 1990) 25

Military Cases:

United States v. Bush,—M.J.—
(Dkt. 96-1239/AF, September 30, 1997) 3

United States v. Bush, 44 M.J. 646
(A.F.Ct.Crim.App. 1997) 2

United States v. Figueroa, 35 M.J. 54
(C.M.A. 1992) 10

United States v. Gipson, 24 M.J. 246
(C.M.A. 1987) 17, 25

United States v. Hill, 41 M.J. 596 (Army Ct. Crim. App.1994) 26, 34

United States v. Houser, 36 M.J. 392 (C.M.A. 1993) 17, 19

United States v. Johnston, 41 M.J. 13 (C.M.A. 1994) 30-33

United States v. Lopez, 35 M.J. 35 (C.M.A. 1992) 9, 10

United States v. Mukes, 18 M.J. 358 (C.M.A. 1984) 19

United States v. Nimmer, 39 M.J. 924 (N.M.C.M.R. 1994), remanded 43 M.J. 252 (1995) 3, 17, 25

United States v. Poole, 30 M.J. 271 (C.M.A. 1990) 12, 13

United States v. Rodriguez, 37 M.J. 448 (C.M.A. 1993) 19

United States v. Washington, 39 M.J. 1014 (A.C.M.R. 1994) 14

Federal Statutes:

28 U.S.C.A. § 1259(3) (West Supp. 1996) 1

10 U.S.C.A. § 867(a) (West Supp. 1996) 1

Article 92, 10 U.S.C. § 892 2

Article 112a, 10 U.S.C. § 912a 2

Constitutional Provisions:

U.S. Constitution Amendment IV 1, 7, 35

U.S. Constitution Amendment V 1, 14, 35

Military Rules of Evidence:

M.R.E. 311 (a) 8

M.R.E. 311(b)(3) 8, 9

M.R.E. 311(b)(3)(c) 8

M.R.E. 311(g)(2) 11

M.R.E. 315(d)(1) 7

M.R.E. 315(f)(1) 7

M.R.E. 315(f)(2) 7

M.R.E. 702 .....14, 19

Published Articles, Opinions:

Developing Hair Testing by Hair Analysis, National Institute of Justice Research in Brief, October, 1993 22

Revised Consensus Opinion on Applicability for Drugs of Abuse, Society of Forensic Toxicologists (SOFT) Advisory Committee, 15 October 1992 23

The Use of Hair Analysis to Document a Cocaine Overdose Following a Sustained Survival Period Before Death, Journal of Analytical Toxicology, Martz, Donnelly, Fetterolf, Lasswell, Hime, and Hearn, Vol. 15, September/October 1991 .....15, 27, 29

Additional References:

WEBSTER'S THIRD NEW INTERNATIONAL DICTIONARY 27 (1966) 15

The petitioner, Staff Sergeant Michael W. Bush respectfully prays that a writ of certiorari issue to review the order and judgment of the United States Court of Appeals for the Armed Forces entered in his case on September 30, 1997.

OPINIONS BELOW

The order and judgment of the United States Court of Appeals for the Armed Forces,__M.J.__(Dkt. No. 96-1239/AF, September 30,1997), is located at Appendix A. The opinion of the United States Air Force Court of Criminal Appeals, published at 44 M.J. 646 (A.F.Ct.Crim.App. 1997) is located at Appendix B.

JURISDICTION

The judgment of the United States Court of Appeals for the Armed Forces was entered on September 30, 1997. The jurisdiction of this Court is invoked under 28 U.S.C.A. § 1259 (3) (West Supp. 1996) and 10 U.S.C.A. § 867(a)(3) (West Supp. 1996).

CONSTITUTIONAL PROVISIONS INVOLVED

The Fourth Amendment to the Constitution of the United States provides in relevant part:

" The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated; and no Warrants shall issue, but upon probable cause, supported by Oath or affirmation, and particularly describing the place to be searched and the persons or things to be seized."

The Fifth Amendment to the Constitution of the United States provides in relevant part:

"No person shall. . .be deprived of life, liberty, or property, without due process of law. . ."

STATEMENT OF THE CASE

Procedural History:

On July 25, 1994, contrary to his pleas, petitioner was convicted of dereliction of duty and wrongfully using cocaine on "at least one occasion", in violation of Articles 92 and 112a, Uniform Code of Military Justice, 10 USC § 892 and 912a, respectively. He was sentenced to a bad-conduct discharge, 45 days confinement, and reduction in rank to E-1. On January 13, 1995, the convening authority approved the sentence.

On June 13, 1996, the Air Force Court of Criminal Appeals affirmed the findings and sentence. 44 M.J. 646. (Appendix B).

On January 9, 1997, the Court of Appeals for the Armed Forces granted review on the following issues of law:

I

WHETHER THE MILITARY JUDGE ERRED TO THE SUBSTANTIAL PREJUDICE OF APPELLANT BY DENYING THE DEFENSE MOTION TO SUPPRESS EVIDENCE OBTAINED AS A RESULT OF AN IMPROPER SEIZURE OF APPELLANT'S HAIR, SINCE THE OMISSION OF INFORMATION FROM THE AFFIDAVIT TO THE MAGISTRATE UNDERMINED THE MAGISTRATE'S FINDING OF PROBABLE CAUSE TO SEIZE THE HAIR.

II

WHETHER THE MILITARY JUDGE ERRED TO THE SUBSTANTIAL PREJUDICE OF APPELLANT BY DENYING THE DEFENSE MOTION TO DISALLOW THE INTRODUCTION OF TESTIMONY CONCERNING THE RESULTS OF THE HAIR ANALYSIS TEST CONDUCTED

ON APPELLANT'S HAIR, SINCE THE TEST WAS NOT A RELIABLE PROCEDURE AS IMPLEMENTED.

On September 30, 1997, the Court of Appeals for the Armed Forces issued its decision, affirming the decision of the United States Air Force Court of Criminal Appeals, holding that the military judge did not legally err by admitting hair-analysis evidence in this case. Citing generally, *Ornelas v. United States*,__U.S.__, 116 S.Ct. 1657 (1996); and *United States v. Nimmer*, 43 M.J. 252 (1995). There was a strong dissent by Judge Crawford concerning Issue I, which petitioner would ask this Honorable Court to carefully consider. *United States v. Bush* __M.J.__ (DKt 96–1239/AF September 30, 1997) Appendix A.

Statement of Facts:

On 15 November 1993 at 0748, Staff Sergeant Michael W. Bush, NCOIC of the Emergency Department, 89th Medical Group, Andrews AFB, MD, was contacted by Senior Airman Imelda Ellis and was informed that he was to report to the base theater between 0800 and 1100 for a random urinalysis. R. 296. SSgt Bush duly reported to the theater at between 0900 and 0930 and went to the restroom with the observer, Technical Sergeant Richard Robichaud, to give his sample. R. 338; R. 342; App. Ex. XVIII. TSgt Robichaud did not notice the appellant act in an unusual manner while he observed him urinate in the container. R. 353–54. TSgt Robichaud and SSgt Bush then brought the sample to the urinalysis entry table where TSgt Robichaud mentioned that the sample seemed clear in color. R. 349. The program manager, Master Sergeant Robert Burgess, asked TSgt Robichaud whether he had observed SSgt Bush provide the sample, and TSgt Robichaud responded that he had.[1] R. 349.

[1]After being investigated and interviewed by the Air Force of Special Investigations, TSgt Robichaud changed his account of the events at trial,

MSgt Burgess felt the sample, and it did not feel cool. R. 316. MSgt Burgess asked SSgt Bush whether he had drank a lot of liquids, and SSgt Bush responded that he had. R. 316. MSgt Burgess, satisfied that there were no problems with the collection, had the sample sealed and mailed it, along with the other samples from the day, to Brooks AFB, TX for testing. R. 316.

On 1 December 1993, Catherine H. Ketchum, the Laboratory Certifying Official at Armstrong Laboratory, Brooks AFB sent a letter to Major Athena Jones, Deputy Staff Judge Advocate, Andrews AFB which stated that SSgt Bush's urine specimen was not urine, but more likely diluted saline. App. Ex. XVIII. Major Jones then gave the letter to Special Agent (SA) David Toni of the Air Force Office of Special Investigations (AFOSI) who began an investigation of SSgt Bush and TSgt Robichaud. R. 13.

SA Toni interviewed SSgt Bush, and he denied submitting a false urine sample. App. Ex. XVIII. He also interviewed SSgt Bush's associates as well as his first sergeant, and found no evidence that SSgt Bush had ever taken illegal drugs. R. 14. He conducted a month-long investigation of SSgt Bush, but the only evidence SA Toni had of possible drug use on the part of SSgt Bush was the allegedly tampered urine specimen from 15 November 1993. R. 29.

Wanting to test SSgt Bush for the presence of drugs, SA Toni sought advice from the Federal Bureau of Investigation (FBI) on hair analysis and how to seize an individual's hair for testing purposes. R. 16. Accordingly, he called the Chemistry/Toxicology Unit of the FBI and spoke with Doctor

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stating that he could not see the flow of urine from SSgt Bush from the point of origin, but only could see "liquid collecting on the bottom of the cup." R.345

Roger Martz, the Unit Chief. R. 16; R. 39–40. Dr. Martz told SA Toni that the length of time a drug will remain in a person's hair is dependent on the length of the hair sample that is seized. R. 16. He also told SA Toni that if it is decided that SSgt Bush's hair is to be seized, it should be taken from the crown of the head. R. 16. In addition, he told SA Toni that head hair grows approximately a half an inch per month. R. 39. This conversation took place before SA Toni prepared an affidavit to support his request for the search and seizure of SSgt Bush's hair, but he did not tell anyone what he had learned regarding the rate of growth of hair and the correlation between this and the amount of time a drug will remain in an individual's hair. R. 40; App. Ex. XVIII.

SA Toni proceeded to seek advice from the Andrews AFB Staff Judge Advocate's (SJA) office on whether to seek the authority to search and seize SSgt Bush's urine and hair for drug testing purposes. R. 18. The base legal office told SA Toni that there was no probable cause to seize SSgt Bush's urine because of the length of time that had passed since SSgt Bush's November urinalysis.[2] R. 27. SA Toni agreed that there was no scientific way that any cocaine that might have been present in the 15 November 1993 urinalysis could also be present in SSgt Bush's urine in January 1994. R. 27. With the limited information it had about hair analysis, the legal office did not dissuade SA Toni from seeking the seizure of SSgt Bush's hair. R. 26–27.

On 12 January 1994, SA Toni submitted an affidavit in support of the seizure of SSgt Bush's hair to Colonel Michael F. Moore, Commander, 89th Support Group. App. Ex. XVIII. After reading the affidavit and discussing the situation with

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[2]Specifically, Major Jones recommended against seizing SSgt Bush's urine "because there wasn't a reasonable expectation drugs would be found in urine given the amount of time that had passed" R. 19.

SA Toni, Col Moore authorized the search and seizure of approximately 100 hairs from SSgt Bush. R. 18; App. Ex. XIX. The affidavit, with regard to the amount of time a drug will remain present in an individual's hair, states only that "hair analysis can detect the use of drugs for months, depending on the length of hair." App. Ex. XVIII. The wording of the affidavit, as well as that of the search and seizure authorization request, was almost a verbatim copy of another affidavit and search and seizure request used to seize hair from an individual at Langley AFB in May 1992. App. Ex. XVIII; XIX; XX. The affidavit makes no mention of the length of SSgt Bush's hair, nor the fact that human hair grows approximately one half inch a month.

On 12 January 1994, SSgt Bush's supervisor, MSgt Carpenter, under the direction of SA Toni, cut approximately one hundred hairs from "as close to the base of the scalp" as possible of SSgt Bush's "quite short" hair. R. 442-443. SA Toni then prepared a forensic laboratory examination request which stipulated that the FBI Laboratory test "approximately 100 hairs, measuring approximately one half (1/2) inch in length" for the presence of illegal drugs. App. Ex. XXI.

The hair sample was sent to the Chemistry/Toxicology Unit of the FBI in Washington DC which received it on 24 January 1994. R. 494. The laboratory tests hair specimens only for cocaine and its metabolite, benzoylecgonine. R. 484. The sample was analyzed by Dr. Brian Donnelly, a special agent examiner for the unit. R. 96. The hair was determined by Dr. Donnelly to be a half-inch in length. R. 501. Dr. Donnelly concluded, using a tandem stage mass spectrometer analysis (MS/MS), that SSgt Bush had consumed cocaine based solely on the fact that the hair contained 17 nanograms per milligram of cocaine and 2.7 nanograms per milligram of benzoylecgonine. R. 552; App. Ex. XXIII. Dr. Donnelly testified that the consensus opinion is that hair analysis is to

be used to corroborate other evidence and is not to be used as the sole test to determine whether one uses cocaine.[3] R. 146–47. Additional facts necessary to the disposition of the case can be found in the argument below.

REASONS FOR GRANTING THE WRIT

I

THE PETITIONER WAS DENIED HIS FOURTH AMENDMENT RIGHT TO BE SECURE IN HIS PERSON, AGAINST UNREASONABLE SEARCHES AND SEIZURES WHEN THE SEARCH AUTHORIZATION (WARRANT) FOR HIS HAIR DID NOT SATISFY THE PROBABLE-CAUSE AND SPECIFICITY REQUIREMENTS OF THE FOURTH AMENDMENT.

Appellant respectfully refers this Honorable Court to the trial defense counsel's motion (App. Ex. VI), the government's response (App. Ex. VII), the evidence on the motion (R. 11–54), and the judge's ruling and findings (R. 85; App. Ex. L).

An impartial commander may authorize the search of a person who is under his control and who is subject to military law. Mil. R. Evid. 315(d)(1). Such a search authorization must be based upon probable cause. Mil. R. Evid. 315(f)(1). "Probable cause to search exists when there is a reasonable belief that the . . . evidence . . . sought is located in the place or on the person to be searched." Mil. R. Evid. 315(f)(2). In determining whether probable cause exists, the magistrate

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[3]In fact, the consensus opinion, as voiced by the Society of Forensic Toxicologists (SOFT) in their Consensus Opinion on Applicability of Hair Analysis for Drugs of Abuse, is tht "hair analysis alone do[es] not constitute sufficient evidence of drug use for application in the workplace." App. Ex. XXV.

should apply the totality-of-the-circumstances test of *Illinois v. Gates*, 462 U.S. 213, 233 (1983). If probable cause does not exist for a search, evidence obtained from such a search is inadmissible against the accused so long as the accused objects and has an adequate interest. Mil. R. Evid. 311(a).

An exception to the rule requiring probable cause is when the search and seizure resulted from a proper authorization to do so, and if (1) "[t]he individual issuing the authorization had a substantial basis for determining the existence of probable cause" and (2) "[t]he officials seeking and executing the authorization or warrant reasonably and with good faith relied on the issuance of the authorization or warrant." Mil. R. Evid. 311(b)(3). The good faith of the officials "shall be determined on an objective standard." Mil. R. Evid. 311(b)(3)(C). *In United States v. Leon*, this Honorable Court stated that the determination of good faith reliance demands a standard of objective reasonableness which requires the officers to have a reasonable knowledge of what the law permits. 468 U.S. 897, 919–20 (1984).

In the present case, there clearly was *not* probable cause to believe that any illegal drugs would be found in the hair of SSgt Bush. The evidence is clear and undisputed that scalp hair grows one-half inch per month and that SSgt Bush's head hair was approximately one-half inch long.[4] Therefore, since the alleged event that solely gave rise to the seizure of the appellant's hair, the urinalysis, happened on 15 November 1993, while the actual seizing of the hair took place on 12 January 1994, nearly two months later, there was not probable cause to believe that illegal drugs would be found in the hair specimen.

As discussed *supra*, lack of probable cause will result in

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[4]The prosecution's expert, Dr. Donnelly, testified to both of these facts. R. 115; R. 136.

seized evidence being deemed inadmissible unless the requirements of Mil. R. Evid. 311(b)(3), the good faith exception, are met. This would permit the admission of the test results of the appellant's hair only if the magistrate, Col Moore, had a substantial basis for finding probable cause *and* if SA Toni reasonably and with good faith relied on the warrant that Col Moore issued.

A magistrate, before authorizing a search, should consider the relationship existing among the crime, objects and place. *United States v. Lopez*, 35 M.J. 35, 39 (C.M.A. 1992). Given the evidence which was presented to him, Col Moore appeared to act in such a manner. The commander was told by SA Toni that he had just been at the legal office and that the Chief of Military Justice, Major Jones, had reviewed the facts and found there to be sufficient information for a search warrant to be issued. R. 18. In addition, Col Moore read the affidavit and discussed the situation with SA Toni. R. 18. However, at no time was he told that head hair grows at a rate of one-half inch per month, nor was he told the appellant's hair length. In fact, all that he was told regarding how long drugs can remain present in hair is that they can be detected possibly three months after they are taken. R. 18.

Thus, these facts give rise to an inquiry as to whether SA Toni reasonably and with good faith relied on the warrant that was issued. "It is clear, first, that the deference accorded to a magistrate's finding of probable cause does not preclude inquiry into the knowing or reckless falsity of the affidavit on which that determination was based." *Leon*, 468 U.S. at 914. Indeed, "it would be an unthinkable imposition upon authority if a warrant affidavit, revealed after the fact to contain a deliberately or recklessly false statement, were to stand beyond impeachment." *Franks v. Delaware*, 438 U.S. 154, 165 (1978).

Before seizing one's hair, a trained investigator acting

reasonably would inquire into the length of time that illegal drugs remain present in a hair sample. SA Toni did this prior to his preparation of the affidavit for the search and seizure warrant through his conversation with Dr. Martz of the FBI. Likewise, a reasonable official would relay such information to the magistrate when notifying him of the pertinent information giving rise to a search and seizure request. In this regard, SA Toni carelessly gave an incomplete and recklessly false statement when he only stipulated in his affidavit that "hair analysis can detect the use of drugs for months, depending on the length of the hair sample." App. Ex. XVIII.

The, then named, Court of Military Appeals in *United States v. Figueroa* stated, "Although *Franks v. Delaware* . . . and Mil.R.Evid. 311(g)(2) deal with misrepresentations and do not specifically address omissions, we believe that omissions of information should be analyzed in the same manner as misrepresentations.[5]" 35 M.J. 54, 56 (C.M.A. 1992) (citation omitted). The Court went on to state that omissions made with reckless disregard for the accuracy of the information given to the magistrate undermine the probable cause determination. *Id.* at 56–57.

SA Toni acted with reckless disregard for the truth[6] when he failed to tell Col Moore that SSgt Bush's hair was quite short and that head hair grows a half an inch per month. If

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[5]Mil. R. Evid. 311(g)(2) states: "If the defense makes a substantial preliminary showing that a government agent included a false statement knowingly and intentionally or with reckless disregard for the truth in the information presented to the authorizing officer, and if the allegedly false statement is necessary to the finding of probable cause, the defense, upon request, shall be entitled to a hearing." Mil. R. Evid. 311(g)(2).

[6]*See United States v. Lopez* where the Court established the rule that "the good-faith exception will not apply when part of the information given to the authorizing official is intentionally false or given with *reckless disregard for the truth.*" 35 M.J. 35, 41 (C.M.A. 1992) (emphasis added).

reported, these facts would have called into question whether the appellant's hair was of a sufficient length to track any substances consumed on or before 15 November 1993, and it would then have been determined that the hair was of an inadequate length.

The government contends that the search warrant does not specify where the hair is to be taken, but it is clear from the record that SA Toni, at the time of his meeting with Col Moore, intended to seize hair from SSgt Bush's head. Dr. Martz, in the conversation that took place before the preparation of the affidavit, told SA Toni where to seize alternative hair only "if there wasn't head hair available." R. 16. SA Toni had been investigating SSgt Bush for over a month at the time of the seizure of the hair, and he knew that SSgt Bush had head hair available. In fact, SA Toni's testimony that Dr. Martz only discussed the growth rate of head hair demonstrates that the conversation with the FBI focused solely on the seizure of head hair.[7] R. 39. Finally, the most convincing evidence of what SA Toni planned to do with the search and seizure request is manifested in his actions themselves—he made no attempt to find out anything about the length, or even existence, of any hair other than head hair, and he made no attempt to seize any hair other than those from SSgt Bush's head.

It was with this same reckless disregard for the truth that SA Toni copied an affidavit and search and seizure request that was done for a case at Langley AFB, VA and submitted them to the magistrate in this case. The facts and circumstances of every case are different, including those of

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[7]In addition, this intention is evidenced by the fact that Dr. Martz told SA Toni to cut head hair from the "crown of the head." R. 16. In fact, Dr. Martz gave SA Toni "[p]rocedures for actually seizing the hair" including "where, exactly [SA Toni] was supposed to take it from, *what part of the head* . . .." R. 16 (emphasis added).

the case at Langley AFB and those present in SSgt Bush's situation. Any trained investigator is aware of this. For example, in the Langley AFB case, the individual tested positive for cocaine in a urinalysis conducted before his hair was seized. App. Ex. XX. This gave officials at Langley AFB corroborating evidence not present in the current case. In addition, the length of the individual's hair at Langley AFB may have been unquestionably long enough to determine whether drugs were present in his hair the date of his urinalysis. This was not the case with SSgt Bush's hair. SA Toni should have reported the facts as *he* knew them - that SSgt Bush had short hair and that head hair grows one-half inch a month. The mere fact that he chose to rely on other AFOSI agents' unrelated work does not relieve him of the fact that he acted with reckless disregard for the truth.

"Probable cause for a search and seizure can exist at one time but because of 'staleness'—the passage of time—can evaporate." *United States v. Poole*, 30 M.J. 271, 274 (C.M.A. 1990). In the case before us, if there were ever probable cause to seize SSgt Bush's hair, it evaporated well before 12 January 1994. This fact should have become unavoidably clear to SA Toni after Major Jones of the Andrews AFB SJA's office told SA Toni not to seize SSgt Bush's *urine* on 12 January 1994 because "there wasn't the reasonable expectation that drugs would be found in urine given the amount of time that had passed." R. 19. Likewise, SA Toni should have been aware of the fact that there was not a "reasonable expectation" that illegal drugs would be found in a hair sample of SSgt Bush's because he was aware of the fact, based on information he alone had received on hair analysis, that SSgt Bush's hair was of an insufficient length to trace back to 15 November 1993.

The conclusion by Judge Colwell that the invalid

urinalysis of 15 November 1993 allowed a finding of probable cause gives rise to an inquiry of when that probable cause would have expired. According to Judge Colwell, it did not expire when one would assume it should have - within a month of the urinalysis. Instead, Judge Colwell ruled simply that a false specimen was a sufficient event for probable cause to arise. Does this mean that six months after an irregular urinalysis an individual's one-half inch hair can be seized? Would this period of probable cause extend for 12 months? Would it extend forever? Obviously not. Given the knowledge that SA Toni possessed but did not divulge, the natural point at which probable cause to seize hair expired in this case was at the point when the hair was no longer able to trace back to the date 15 November 1993.

As the, then named, Court of Military Appeals in *Poole* stated, "[s]ubsequently received information which negates . . . the information initially relied on in finding probable cause also can destroy the basis for finding probable cause." *Id.* at 275. When Dr. Martz told SA Toni that hair analysis can track drug use for up to a month of time for every half-inch of hair, this information negated the possibility of probable cause being present.

As this Honorable Court stated in *United States v. Leon*, an officer would not be manifesting "objective good faith in relying on a warrant based on an affidavit 'so lacking in indicia of probable cause as to render official belief in its existence entirely unreasonable.'" 468 U.S. at 923 (citation omitted). Since the alleged event that solely gave rise to the seizure of the appellant's hair, the urinalysis, happened on 15 November 1993, while the actual seizing of the hair took place on 12 January 1994, nearly two months later, an investigator acting in good faith would know that there was not probable reason to believe that illegal drugs would be

found in the hair.

SA Toni was far short of being complete and candid in the information he gave Col Moore.[8] He, in fact, was grossly negligent for not reporting the facts as he knew them, and he clearly did not manifest objective good faith in his report to Col Moore. The lack of both probable cause and objective good faith in this case negates the admissibility of the analysis of SSgt Bush's hair sample.

II

THE PETITIONER WAS DENIED HIS FIFTH AMENDMENT RIGHT TO DUE PROCESS WHEN THE MILITARY JUDGE ERRED TO THE SUBSTANTIAL PREJUDICE OF THE APPELLANT BY DENYING THE DEFENSE MOTION TO DISALLOW THE INTRODUCTION OF TESTIMONY CONCERNING THE RESULTS OF THE HAIR ANALYSIS TEST CONDUCTED ON THE APPELLANT'S HAIR, SINCE THE TEST WAS NOT A RELIABLE PROCEDURE AS IMPLEMENTED.

"If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise." Mil. R. Evid. 702. The Analysis of the Military Rules of Evidence in explaining Mil. R. Evid. 702 states, "The Rule's sole explicit test is whether the evidence in question 'will assist the trier of

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[8]*See U.S. v Washington* where the Army Court of Military Review found that investigators did not rely in good faith on a search authorization which they obtained by being less than candid with the commander. 39 M.J. 1014, 1019 (A.C.M.R. 1994). As a result, the court ruled the seized items were inadmissible. *Id.* at 1016.

fact to understand the evidence or to determine a fact in issue.'" Mil. R. Evid., App. 22–45.

As discussed *supra*, SSgt Bush's hair specimen was subjected to analysis by the FBI which analyzed it for cocaine and its metabolite, benzoylecgonine. R. 497. Dr. Donnelly of the Chemistry/Toxicology Unit of the FBI tested the sample using a tandem stage spectrometer machine, an accepted instrument in the scientific community.[9] He used a methodology that is contained in a three page article in the Journal of Analytical Toxicology entitled *The Use of Hair Analysis to Document a Cocaine Overdose Following a Sustained Survival Period Before Death* and concluded that "[t]hat [SSgt Bush] consumed cocaine." R. 138; 552; App. Ex. XXIV. He came to this conclusion despite the fact, admitted even by him, that the test is not to be used as the sole test to determine drug use, but, instead, is to be used "[t]o corroborate other evidence." R. 146–47. Moreover, by drawing a conclusion on SSgt Bush's *behavior*, he undermines his stated goal of hair analysis testing—"to determine scientifically that something exists." R. 540.

In addition to his testimony at trial, Dr. Donnelly's belief that hair analysis should be used to corroborate other evidence is enunciated in Appellate Exhibit XXIV, an article in the Journal of Analytical Toxicology authored by Dr. Donnelly and Dr. Martz as well as two other scientists from the Chemistry/Toxicology Unit, which states in its abstract: "The use of hair analysis as an *adjunct*[10] to traditional analytical techniques *may* help document drug use history[11] . . .." App.

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[9]Dr. Goldberger, the appellant's expert witness, recognized Dr. Donnelly's MS/MS equipment as a hair analysis instrument that is accepted in the scientific community. R. 572.

[10]The dictionary defines the word "adjunct" as "an accompaniment or auxiliary to another thing." Webster's Third New International Dictionary 27 (1966).

Ex. XXIV (emphasis added). This three page magazine article, which includes the above compendium, served as the testing procedure which Dr. Donnelly used to come to the conclusion that the results were "most consistent with someone using [cocaine] on a fairly regular basis." R. 138; 521.

The first issue thus becomes whether there was other evidence of drug use on SSgt Bush's part which Dr. Donnelly could have used to corroborate his hair analysis results. There is nothing contained in the record of trial to give any indication that there was.[12] Given this, Dr. Donnelly clearly drew a conclusion using a methodology and technique that has *never* been used before in a criminal court of law—the use of hair analysis as the singular piece of information upon which to conclude that an individual has used an illegal drug.[13]

The admissibility of a scientific methodology is

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[11]Despite the overwhelming evidence that hair analysis should only be used to corroborate other evidence of drug use, Judge William Colwell, in his ruling on the motion in limine regarding the admission of the hair analysis, stated, "The Court finds no requirement that the MS/MS test may only be admitted if supported by other evidence that corroborates the test - such as a positive urinalysis test." App. Ex. LI.

[12]Dr. Donnelly must have been cognizant of the fact that SSgt Bush's hair sample could not possibly track any consumption of illegal drugs that took place on or before 15 November 1993, because he measured SSgt Bush's hair sample and he was aware of the growth rate of head hair.

[13]Hair analysis has been proffered as evidence of drug use in settings other than criminal prosecutions. *United States v. Medina* 749 F. Supp. 59 (E.D.N.Y 1990) (parole revocation hearing); *Nevada Employment See Dept. v. Holmes,* 112 Nev. 275, 914 P2d 611 (Nev. 1996) (disqualification for unemployment benefits); *Matter of Adoption of Baby Boy L.,* 157 Misc. 2d 353, 596 N.Y.S. 2d 997 (N.Y. Fam.Ct. 1997) (adoption hearing); and *Hicks v. City of New York,* 172 Misc. 2d 994, 660 N.Y.S. 2d 953 (N.Y. Sup. 1997) discharge from employment as New York City police officer.

primarily a question of law. *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 113 S. Ct. 2786 (1993); *United States v. Gipson*, 24 M.J. 246 (C.M.A. 1987). Although the admission or exclusion of expert testimony usually is left to the discretion of the trial judge unless clearly erroneous, *United States v. Houser*, 36 M.J. 392, 397–98 (C.M.A. 1993), the decision of a trial judge to admit expert testimony based on new scientific theories should be reviewed *de novo*.

At least two Circuit Courts of Appeal have ruled that in those cases where the expert opinion is derived from a particular scientific technique, *de novo* review is appropriate. *See Cella v. United States*, 998 F.2d 418, 424 (7th Cir. 1993); *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 951 F.2d 1128, 1130 (9th Cir. 1991), *remanded on other grounds*, 113 S. Ct. 2786 (1993). The *Cella* court agreed with the reasoning of the Ninth Circuit in *Daubert*, and other courts, cogently stating that "because the reliability of the scientific technique or process does not vary according to the circumstances of each case, it is inappropriate to view this question of reliability as a matter solely within the discretion of the trial judge." *Cella*, 988 F.2d at 423.

The *Cella* court's reasoning makes good sense. Were it not the case, different trial judges could make opposite rulings on the admissibility of a particular scientific technique and their decisions would only be reviewable under the clearly erroneous standard. The possibility of inconsistent rulings by trial courts becomes particularly evident in the area of hair analysis. For example, in *United States v. Nimmer*, the trial court ruled that exculpatory defense expert testimony regarding the results of tests of the defendant's hair samples for one-time cocaine use could not be presented to the members. 39 M.J. 924, 926 (N.M.C.M.R. 1994). The Navy and Marine Court of Military Review adopted the military

judge's findings, including the following:

> [T]he court's concern [is] that, while the procedures employed, that is, RIA [radioimmunoassay] and GCMS [gas chromatography/mass spectrometry], may be beyond reproach, the underlying theory and knowledge deficit in this area remain. . . . Consequently, the court is convinced that the results of analyzing hair for drugs is inadmissible because *it lacks the necessary scientific underpinning to reliably be able to detect a one-time use of cocaine.* In short it lacks the objective, demonstrative certainty associated with science.

Id. at 927–28 (emphasis included in original). These findings on the use of hair analysis are in direct conflict with the trial judge's findings in the present case[14].

Conflicting holdings on the admissibility of scientific evidence, such as those demonstrated above, lead to a lack of certainty and predictability about scientific evidence in courts. The *Cella* court understood the soundness of having uniform precedent within the federal system regarding the reliability of particular scientific techniques while "recognizing the trial judge's particular opportunity to evaluate the expert's testimony." 988 F.2d at 423.

The Court of Appeals for the Armed Forces has defined "abuse of discretion" regarding expert testimony as follows:

> In reviewing each of these factors, the standard on appeal is whether the military judge has abused his or her discretion. To establish this, appellant must come "forward with conclusive argument" that there was an abuse of discretion. *See United States*

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[14]See note 12 *supra* for the portion of Judge Colwell's ruling which conflicts with *Nimmer.*

v. Mukes, 18 MJ 358, 359 (C.M.A. 1984) As Judge Magruder once observed:

> Abuse of discretion is a phrase which sounds worse than it really is. All it need mean is that, when judicial action is taken in a discretionary matter, such action cannot be set aside by a reviewing court unless it has a definite and firm conviction that the court below committed a clear error of judgment in the conclusion it reached upon a weighing of the relevant factors.

Houser, 36 at 397-98 (citation omitted). The "relevant factors" to be weighed in this case are those set forth by this Honorable Court in *Daubert v. Merrell Dow Pharmaceuticals*, 113 S.Ct. 2786 (1993).

Daubert established the standard to be employed to determine whether an expert's testimony is admissible. In *United States v. Rodriguez*, the Court of Military Appeals cited *Daubert* as the analysis to be used to determine whether the reliability requirement of Mil. R. Evid. 702 has been met. 37 M.J. 448 (C.M.A. 1993). In *Daubert*, this Honorable Court construed Rule 702 as requiring a twofold inquiry to determine whether an expert's testimony is admissible: (1) whether the scientist's testimony will assist the trier of fact, and (2) whether it amounts to "scientific knowledge." 113 S. Ct. at 2796. In addition, the Court identified factors to be considered in determining whether expert evidence is admissible. These five factors are: (1) whether the technique has been tested, (2) whether the technique has been subjected to peer review and publication, (3) whether the technique has a known error rate, (4) whether there are standards for using the methodology, and (5) whether the methodology is generally accepted. *Id.* at 2796–97. The expert testimony in the present case fails to meet the criteria of even one of these

factors. Overall, *Daubert* mandates "the trial judge must ensure that any and all scientific testimony or evidence admitted is not only relevant, but *reliable*." *Id.* at 2795 (emphasis added).

Implementing *Daubert*, the first aspect of Dr. Donnelly's methodology to be reviewed is the testability of the technique. *Id.* at 2796. The evidence that was presented at trial is overwhelming in its showing that Dr. Donnelly's procedure is untested and unreliable. For example, when asked about the testability of Dr. Donnelly's methodology, Dr. Goldberger called Dr. Donnelly's methodology "not conventional." He elaborated on this assessment by stating:

> Nowadays we have better procedures. Unfortunately, I can't tell you if [Dr. Donnelly's results are] an accurate measurement. The reason why is there is no data here for external control, a common sample that they could buy from NIST or some other commercial vendor, or that they can prepare in-house and then develop data on it. And then show to me that the control behaved properly.

R. 170.

Dr. Donnelly himself acknowledged that there were concerns regarding the newness of hair analysis, as well as the fact that certain areas have not been tested fully enough to ensure that the test is accurate. He stated:

> Some of the concerns have been external contamination, the fact that they believe that one could possibly get cocaine on the outside of the hair accidentally in some way, shape, or form. The incorporation of the drug into the hair is not fully understood. It's still being looked into.

R. 109.

Regarding the unreliable nature of the test, Dr. Goldberger testified that a study conducted by Fred Smith of the University of Birmingham showed that many children exposed to cocaine externally through their mothers' crack cocaine vapor actually had more cocaine in their hair than their drug abusing mothers had in their hair samples. R. 172–73. Dr. Goldberger also described another study which was conducted to test the trustworthiness of the MS/MS procedure to differentiate between external and internal contamination:

> The Navy Research laboratory, they do have a triple quad mass spectrometer similar to Doctor Donnelly's. And they've been studying extensively the contamination issue. I believe Doctor Kidwell's position on this continues to be the same, that we can't differentiate external contamination from internal incorporation.

R. 173.

Further, Dr. Goldberger testified that the effect that race has on the analysis also has not been fully tested, but that "it seems that hair of black individuals concentrate more drug and also more readily, and it's based upon the melanin, or the compound in the hair that provides color."

R. 576.

The lack of an ability to test the results of Dr. Donnelly's procedure is best illustrated by the lack of reliability of the quantification method. Dr. Goldberger testified to this during cross examination:

> Q. If the test revealed an nanogram level of 17, 17 nanograms of cocaine in the hair, then you are pretty comfortable that there in fact probably was 17 nanograms of cocaine in the hair?

A. No. I have no comfort level in the 17 nanogram reading for various reasons. One of them is the quantitation method utilized. Secondly, the lack of controls —

Q. But you just said that you are comfortable with the testing technique.

A. I'm comfortable with MS/MS. I'm not comfortable with the quantitation technique and the lack of controls. Controls being external quantitative controls to check accuracy of the test procedure. That could be 17 or 1.7 or 170, I couldn't tell you, or it could be off by any other factor, too.

R. 178–79.

The appellate exhibits also demonstrate the fact that there are many questions yet to be answered regarding hair analysis. For example, Appellate Exhibit XXVII, an October 1993 article in the National Institute of Justice Research in Brief entitled *Developing Hair Testing by Hair Analysis*, stated:

Hair analysis has a number of unknowns, some of which involve establishing its utility and determining how it will be applied to obtain information about drug use. Among questions to be explored are:

– Is environmental contamination of hair (the entry of drugs through smoke, for example) significant, and can current testing procedures distinguish between exposure and use?

– Can detection of drugs be evaded through hair treatments (for example, shampoos and conditioners)?

– Do some hair types retain drugs more than others? (Does thicker hair, for example, retain more than thinner hair?)

– To what extent can drugs enter hair through sweat or other nonblood routes: how does this affect the distribution of the drug along the length of the hair shaft and associated time profiles?

– How long does it take for a drug to appear in the hair? Do the absorption rates of various drugs differ?

– To what extent is the concentration in the hair related to the amount of drug taken? How does the concentration vary for different drugs?

App. Ex. XXVII.

The same article describes hair analysis testing that is being conducted at research facilities. Once again the results demonstrate that hair analysis has not been fully tested and that continuing study is needed:

The scientific bases of hair testing are being explored in a project under way at the University of California at Davis. This study, which focuses on cocaine, is addressing questions about the mechanisms by which drugs are absorbed into hair and other issues related to the value of hair test results as evidence. Among the research questions are:

– Is the amount of the drug (or its metabolites) found in hair related to the amount ingested?

– What is the time lag between drugs ingestion and its appearance in hair?

– Is it possible to distinguish between drugs ingested and drugs that show up in the hair through external exposure? (For instance, if a drug user puts a sweaty hand on a nondrug user's hair, the nondrug user's hair may test positive.)

– Can externally applied drugs be removed from the hair by washing or other means?

App. Ex. XXVII.

The Revised Consensus Opinion on Applicability of Hair Analysis for Drugs of Abuse which was prepared by the Society of Forensic Toxicologists (SOFT) Advisory Committee on 15 October 1992[15] found that "[c]ritical questions remain to be answered before the results of hair drug tests for workplace applications can be accurately interpreted." App. Ex. XXV. It should be emphasized that this opinion found the test unreliable for *workplace* applications, and did not even address the much more serious issue of its use to solely convict one of criminal conduct. This consensus opinion listed problem areas for the procedure, and stated that certain areas required more study. Among these are:

> a. Is incorporation, retention, and analytical detection of drugs in hair biased by race, age, sex, or other individual differences?
>
> b. To what extent is an externally applied drug from environmental exposure retained in hair, and what effect(s) do hygienic washing practices and cosmetic treatments have on externally applied drugs?
>
> c. Is retention and detection of drugs in hair affected by cosmetic treatments or by intentional efforts to avoid detection?
>
> d. Do various laboratory hair pretreatment procedures effectively remove externally applied drug or internally incorporated/bound drug? Are washing procedures effective in distinguishing between environmental contamination and internal incorporation of drugs?

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[15]Both Dr. Goldberger and *Dr. Donnelly* participated in this committee and *both contributed to the drafting of the consensus opinion.* R. 145–46.

> e. What acceptance criteria should be utilized to establish a positive hair drug testing result?

App. Ex. XXV. As Dr. Donnelly testified, these concerns of the international scientific community remained unchanged as of June 1994 when toxicologists met in Italy to discuss the issue. R. 100. The problems with hair analysis described above were effectively disregarded by Dr. Donnelly when he came to the conclusion that SSgt Bush had used drugs.

There is overwhelming evidence that the reliability of the hair analysis test has not been sufficiently tested. This is an understandable fact given the difficulty in finding candidates to participate honestly in a study regarding the consumption of illegal drugs. Nonetheless, *Daubert* is clear in mandating that a procedure "can be and has been tested." 113 S. Ct. at 2796. "The criterion of the scientific status of a theory is its falsifiability, or refutability, or testability." *Id.* at 2797 (citation omitted). Uncorroborated hair analysis does not meet this criterion.[16]

The second prong of the Daubert test is whether the technique has been subjected to peer review and publication. *Id.* As the appellate exhibits illustrate, hair analysis has been subjected to peer review; however, as is demonstrated *supra*, the opinion expressed by Dr. Donnelly's peers is that hair analysis has not been refined to the point where it can be used to convict an individual without some other corroborating evidence. In the landmark case of *United States v. Gipson* which overruled the *Frye*[17] standard for expert testimony,

[16]*See United States v. Nimmer*, 39 M.J. 924 (N.M.C.M.R. 1994); *United States v. Foote*, 898 F.2d 659 (8th Cir. 1990) (the court did not find that the trial court abused its discretion by disallowing testing hair for drugs partly because of the unreliable nature of the test).

[17]In *Gipson*, the court expressly rejected the *Frye* standard in favor of a more liberal interpretation of Mil. R. Evid. 702. 24 M.J. 246, 251 (C.M.A. 1987). Under *Gipson*, the analysis of whether expert evidence is admissible should focus on the reliability of the evidence. *Id.*

Judge Everett stated in his concurrence, "In determining admissibility [of expert] evidence the judge should heed carefully the principal opinion's observation that 'one of the most useful tools is' the 'degree of acceptance in the scientific community.'" 24 M.J. 246, 255 (C.M.A. 1987) (citation omitted). He continued, "At the very least, *the expert witness should be able to relate his theories to scientific principles having a substantial body of adherents.*" *Id.* (emphasis added).

Therefore, while Dr. Donnelly's hair analysis technique has been subjected to peer scrutiny, that review has overwhelmingly found that hair analysis is not yet a reliable technique for use even in workplace situations. The only peer publication the appellee submitted which was favorable to Dr. Donnelly's technique is one *written by members of the FBI laboratory which conducted the hair analysis in the case itself.* App. Ex. XXIV. Even this article only concludes that "hair analysis *might* be used to document *exposure* to drugs in situations where traditional specimens, such as blood and urine, have not been collected in a timely fashion." App Ex. XXIV (emphasis added). Thus Dr. Donnelly's own article does not even substantiate his finding that SSgt Bush *consumed* cocaine.

Daubert emphasizes that peer review does not necessarily correlate with reliability. 113 S. Ct. at 2797. When the government can only support the scientific methodology of its expert through an article written by that expert and his laboratory, the trial judge failed "to ensure that any and all scientific testimony is not only relevant, but reliable." *United States v. Hill*, 41 M.J. 596, 599 (Army Ct. Crim. App. 1994) (quoting *Daubert*, 113 S. Ct. at 2795). An article reviewing one's own technique hardly passes for peer review and publication which ensures reliability.

The third prong of the *Daubert* test is whether the technique has a known error rate. 113 S. Ct. at 2797. This

aspect of *Daubert* is particularly telling in the present case as the error rate of Dr. Donnelly's technique was never stated at the trial, nor is it present in any of the appellate exhibits. As the discussion above indicates, all the literature and testimony presented at trial points toward the fact that the error rates for hair analysis simply are not known yet. In fact, the National Institute of Justice conveyed in its 1993 article that hair analysis needed five more years of study before it could be validated as a reliable test. App. Ex. XVII.

The closest thing one can find to a known error rate is the article in the *Journal of Analytical Toxicology*, Appellate Exhibit XXIV, which the Chemistry/Toxicology Unit wrote and which Dr. Donnelly refers to at one point as his standard operating procedure (SOP). R. 138. The article states in its results and discussion:

> The findings of cocaine in Segments 4 and 5 are somewhat baffling, because, according to the work of Cone et. al., these segments should have been negative given the short half-life of cocaine and the absence of cocaine from the body fluids of the subject at the time of the autopsy.

App. Ex. XXIV. While this is not an error rate, it is an admission by the FBI that results from hair analysis are not always as they should be. The test results in the example study in the article did not come out as the FBI expected - *they got positive results for the presence of cocaine when they expected negative ones.*

All the questions which surround hair analysis have not yet been answered, thus the scientific world has not yet been able to calculate an error rate for hair analysis as it does in urinalysis testing. When Dr. Goldberger was asked to testify to the current state of hair analysis, he responded:

> [t]here are many other concerns that have been drafted by SOFT, drafted by NIST and others. In my opinion, I don't believe that we have sufficient data on these items to gain the confidence in the hair test.

R. 172.

"[S]omewhat baffling results" in a standard operating procedure used by the government's expert, no error rate presented in any evidence by the government, and insufficient data for proper verification of a test surely does not meet the standard this Honorable Court envisioned when it stated in *Daubert*, "the court ordinarily should consider the known or potential rate of error." 113 S. Ct. at 2797.

The fourth test that *Daubert* discusses is whether there are standards for using the methodology. *Id.* Perhaps the most important standards which must be followed in an analysis case are those which outline the procedures to be used in implementing the chain of custody. Detailed documentation and precise following of agreed upon procedures ensure that an individual's sample will not be tampered with. Thus, the appellant views with great concern Dr. Donnelly's assertion that the chain of custody procedures of the FBI have not been updated since the laboratory was founded fifty years ago. R. 491.

There are numerous problems with the chain of custody procedures that the FBI employs at its Chemistry/Toxicology Unit. For example, NIDA, a national laboratory certifying organization, mandates internal chain of custody procedures, but Dr. Donnelly's laboratory has none. R. 571. Lack of an internal chain of custody results in uncertainty in who handles samples, whether the samples are handled properly and in a timely fashion, and whether samples are secured before being left overnight in a laboratory. R. 571–72. Additionally, despite the fact that at least three people had access to the

specimen, there is no record of who examined SSgt Bush's hair and when that examination took place. R. 130. In fact, Dr. Donnelly's assistant, who had equal access to the hair sample, never even signed any chain of custody documentation to record this fact. R. 168.

Another procedural concern is the fact that Dr. Donnelly does not calibrate his instrument before every use to ensure reliability. R. 132. Instead, he relies on a negative control consisting of a previously untested hair sample of his or his partner's head. R. 132. Thus as a negative control, Dr. Donnelly uses untested samples of individuals who work around cocaine. Also, at different times there has been large quantities of cocaine stored in the FBI laboratory, but no measurements have ever been taken to ensure that none of this cocaine contaminates hair samples. R. 128–29. All of this undercuts the reliability of the laboratory since the last time the laboratory was subjected to a blind control test using a hair sample provided by an outside commercial source was two years before the trial. R. 133.

There are two sets of procedures which document the standards that Dr. Donnelly apparently used to conduct SSgt Bush's hair analysis: (1) a three page magazine article that he and his colleagues wrote entitled *The Use of Hair Analysis to Document a Cocaine Overdose Following a Sustained Survival Period Before Death*, and (2) a one page analysis of SSgt Bush's hair sample which can be found on the third page of Appellate Exhibit XXIII.[18] The article, as the title suggests, describes how to test to see if a particular type of deceased, one who had a sustained survival period before death, died of a cocaine overdose. Thus, what apparently is claimed to be a SOP by Dr. Donnelly is actually a description

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[18]What exactly serves as his SOP cannot be determined with certainty from Dr. Donnelly's testimony as he refers to both documents as his SOP. R. 138; R. 189.

of a procedure used to determine if a deceased consumed cocaine, an inquiry obviously which was not before the trial court. If, on the other hand, the government considers the analysis page from Appellate Exhibit XXIII the SOP, then Dr. Donnelly's SOP falls woefully short of a lengthy and detailed document that describes the procedure employed and the rules and descriptions of how to interpret the data as a SOP should. R. 169. This page is simply an analysis of what was found in SSgt Bush's hair sample and not a manual which one could follow to understand the standardized procedure that Dr. Donnelly uses on every hair sample he tests.

In either case, Dr. Goldberger flatly rejects the idea that *any* documentation Dr. Donnelly presented the appellant could adequately serve as a SOP. R. 169. He testified that the average length of a SOP is between fifteen and twenty pages and contains a great deal more specifics then the documents which Dr. Donnelly presented at trial. R. 169. In fact, Dr. Goldberger testified that a major problem with the documentation that Dr. Donnelly presented at trial is that it does not even discuss benzoylecgonine which the laboratory tested for in SSgt Bush's case and which Dr. Donnelly used to come to his conclusion that SSgt Bush consumed cocaine. R. 169–70.

Another serious problem with Dr. Donnelly's analysis is that it sets no minimum cut-off level. R. 141. A cut-off level is necessary because of the possibility of incidental external contamination of the hair sample. This is particularly true in this case because the amount of cocaine in the hair sample could be 17, 1.7 or .17 nanograms of cocaine. R. 573. Judge Wiss in his dissent in *United States v. Johnston* elucidates the importance of having a minimum established cut-off point for urinalysis:

> The oft-encountered DoD regulations establish the Drug Abuse Testing Program, as well as counterpart

> regulations in the Department of Transportation that apply to the Coast Guard, in a variety of ways to restrict the *Government's* use of urinalysis results. Maybe out of concern for individual service-persons and to assure that none is put through the wringer of a court-martial without virtually sure-fire scientific evidence of knowing use—or maybe in an effort to maintain prosecutorial and support resources by avoiding collateral litigation in drug prosecutions over less sure-fire scientific evidence - the government has established certain cut-off points, above which is 'positive' . . .. Typically, below such points is a 'negative,' and prosecutions based on such evidence are barred. Reportedly, the cut-off points are set high enough that, in the usual case and with all other variables constant, scientists would agree that the test reflects recent knowing use.

41 M.J. 13, 20 (C.M.A. 1994) (emphasis in original).

Then Judge Cox in his concurring opinion in *Johnston* also recognized the fact that there should be established a "positive" level where one could be sure that an illegal substance found in a specimen is at a high enough level for "an expert to opine that an accused knowingly ingested the illegal substance." *Id.* at 17. This standard obviously would have to be set by experts in the relevant field who are able to make a clinical estimation of what level could serve as a "positive" level. Yet Dr. Donnelly testified to the following during cross-examination:

> Q. I'm going to get into what your cut off level is and what you've assigned it, but is there any—there is no set cut off level, is there?

> A. A cut off level has to do with a number that someone arbitrarily picks. *It has nothing to do with science.*
>
> Q. Oh, so, like with the Brooks lab where we have cut off levels for urine, you're saying that's just arbitrary?
>
> A. Yeah. You change them periodically depending upon a meeting of individuals.

R. 539–40 (emphasis added). Such a cavalier attitude toward cut-off levels is shocking coming from someone professing to be an expert and should concern this Honorable Court. The foregoing testimony that cut off levels are arbitrary and have nothing to do with science and that the urinalysis laboratory at Brooks AFB sets its minimum levels arbitrarily directly calls into question whether Dr. Donnelly places any standards at all on his testing procedures and whether he understands the importance of such procedures. A cut-off level is established so an expert can be scientifically certain that an individual consumed an illegal substance. *Johnston*, 41 M.J. at 17. They are not numbers which laymen pull out of a hat as Dr. Donnelly implies.

The Department of Defense has not yet established minimum cut-off points for hair analysis as it has for urinalysis, and, as the above testimony indicates, the procedure employed in the present case has no minimum cut-off points established by the test administrator either. R. 141. Theoretically, per Dr. Donnelley's testing procedure, any amount of a drug, no matter how slight, would be viewed as a positive test for cocaine. Then it would be left to the trier of fact to determine whether .1 or 1 or 2 or 17 nanograms of cocaine in a hair sample is sufficient to constitute a positive test. This goes beyond the holding of the majority in

Johnston[19] because the government is not offering into evidence a level that falls below the regulation minimum, it is offering into evidence an amount with no standard, by either the DoD or the testing agency, and is using this evidence without any corroboration. The test is useless without guidelines and those guidelines, at a minimum, must be introduced into evidence to assist the trier of fact.

Incomplete and insufficient documentation of procedures undermines the reliability of Dr. Donnelly's testing. In the present case, appellant was not presented with any written SOP which could have been used to examine the test as it was actually conducted. This violates both the letter and the spirit of *Daubert*, because appellant was not able to ensure that Dr. Donnelly's procedure was reliable nor verify that Dr. Donnelly employed his procedure accurately. Clearly Dr. Donnelly used insufficient standards when employing his methodology.

The final prong of *Daubert* is whether the methodology is generally accepted. 113 S. Ct. at 2797. The evidence in this case quite clearly shows that Dr. Donnelly's hair analysis methodology is not accepted in the forensic toxicology community. This fact is evident in Dr. Goldberger's testimony, the SOFT advisory committee opinion, and the article in the *National Institute of Justice*. App Ex. XXV; App Ex. XXVII. The consensus of the most recent meeting of the international forensic toxicological scientific community, prior to trial, in June 1994 was that hair analysis should not be used as the sole test to determine if one has used drugs. R. 577. Dr. Goldberger summarized the findings of that

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[19]In *Johnston*, the Court of Military Appeals let stand the trial judge's determination that urinalysis test results which showed the presence of marijuana below the minimum cut-off levels was inadmissible based on Mil. R. Evid. 403. 41 M.J. at 16.

committee in the following manner: "[B]asically the opinion was that a hair test should not be used as a sole test and should only be used to corroborate other medical evidence." R. 577. Dr. Goldberger then testified that "a hair sample of a half an inch collected from the defendant in January would not corroborate" a "positive *urine* sample from November." R. 578 (emphasis added). In the case before this Court, the corroboration presented by the government was a two-month old non-urine urinalysis sample.

In applying *Daubert* to this case, it is helpful to look at its application in the military justice system in similar situations. In *United States v. Hill*, the Court applied Daubert and concluded that the government in that case failed to establish the reliability of luminol testing:

> We find that luminol is a technique that can detect hidden blood and that this technique 'can be and has been' tested. However, such testing has revealed that luminol is limited to disclosing only a presumptive positive presence for blood, not a confirmatory presence for blood.

41 M.J. 596, 601 (Army Ct. Crim. App. 1994). Likewise, it was established in the present case that hair analysis can detect the presence of drugs in a hair sample. However, it was also established that to have conclusive evidence that an individual consumed those drugs, corroborating evidence must be present. No corroborating evidence was presented by the government at trial.

The Court in *Hill*, while rejecting the admissibility of the luminol expert's evidence, did recognize that the expert calculated an estimated error rate, a reliability factor from *Daubert* which was not even done in the present case. *Id.* at 602. Moreover, the *Hill* Court looked at whether luminol testing was accepted in the justice community as a confirmative test of the presence of blood, and found that it

was not. *Id.* at 601–02. In the case *sub judice*, the Court of Appeals for the Armed Forces by affirming the Air Force Court of Criminal Appeals' decision below and the trial court's finding of admissibility of Dr. Donnelly's hair analysis, appears to have become the only court in the nation to allow a defendant to be convicted of a crime based solely on an uncorroborated hair analysis test.

In the case *sub judice*, the trial judge admitted evidence that is totally unsupported by the scientific community - an expert's conclusion that a defendant used cocaine based solely on a problem-plagued hair analysis. Dr. Donnelly's testimony at trial was based on an unreliable procedure, and it was plainly error for the judge to have admitted it.

Appellant respectfully refers this Honorable Court to the trial defense counsel's motion (App. Ex. VIII), the government's response (App. Ex. IX), the evidence on the motion (R. 90–193), and the judge's ruling and findings (R. 213–14; App. Ex. LI).

CONCLUSION

The petitioner has been denied his Fourth and Fifth Amendment rights and protections. His hair was seized using an invalid search authorization and the hair analysis evidence used to prosecute, convict, and deny him his freedom was unreliable under this Court's standards discussed in *Daubert* and should have been inadmissible. The decision of the United States Court of Appeals for the Armed Forces should be reversed.

The petition for a writ of certiorari should be granted in this important case.

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APPENDIX A

UNITED STATES, Appellee,

v.

Michael W. BUSH, Staff Sergeant
U.S. Air Force, Appellant

No. 96–1239

Crim. App. No. 31462

UNITED STATES COURT OF
APPEALS FOR THE ARMED FORCES

Argued: May 14, 1997

Decided: September 30, 1997

Attorneys

For Appellant: *Major Kevin P. Koehler* (argued) and *Lieutenant Colonel Kim L. Sheffield* (on brief); *Colonel David W. Madsen.*

For Appellee: *Lieutenant Colonel Michael J. Breslin* (argued); *Colonel Theodore J. Fink* (on brief)

Military Judge: William S. Colwell

Opinion of the Court

SULLIVAN, Judge:

During July of 1994, appellant was tried by a general court-martial composed of officer members at Andrews Air Force Base, Maryland. Contrary to his pleas, he was found guilty of dereliction of duty by failure to provide a urine sample; and wrongfully using cocaine, in violation of Articles 92 and 112a, Uniform Code of Military Justice, *10 U.S.C. 892*

and 912a, respectively. He was sentenced to a bad-conduct discharge 45 days' confinement and reduction in rank to E–1. On January 13, 1995, the convening authority approved the sentence. On June 13, 1996, the Court of Criminal Appeals affirmed. 44 M.J. 646.

On January 9, 1997, this Court granted review on the following questions of law:

I

WHETHER THE MILITARY JUDGE ERRED TO THE SUBSTANTIAL PREJUDICE OF APPELLANT BY DENYING THE DEFENSE MOTION TO SUPPRESS EVIDENCE OBTAINED AS A RESULT OF AN IMPROPER SEIZURE OF APPELLANT'S HAIR, SINCE OMISSION OF INFORMATION FROM THE AFFIDAVIT TO THE MAGISTRATE UNDERMINED THE MAGISTRATE'S FINDING OF PROBABLE CAUSE TO SEIZE HAIR.

II

WHETHER THE MILITARY JUDGE ERRED TO THE SUBSTANTIAL PREJUDICE OF APPELLANT BY DENYING THE DEFENSE MOTION TO DISALLOW INTRODUCTION OF TESTIMONY CONCERNING THE RESULTS OF THE HAIR ANALYSIS TEST CONDUCTED ON APPELLANT'S HAIR, SINCE THE TEST WAS NOT RELIABLE PROCEDURE AS IMPLEMENTED.

We hold that the military judge did not legally err by admitting hair-analysis evidence in this case. See generally *Ornelas v. United States*,—U.S.—, 116 S. Ct. 1657 (1996); and *United States v. Nimmer*.

43 M.J. 252 (1995).

The Court of Criminal Appeals found the following facts pertinent to this appeal:

On November 15, 1993, appellant was selected to provide a sample for a random drug urinalysis. He showed up at the base theater, as he was directed to do. Thereafter, accompanied by Technical Sergeant (TSgt) Robichaud, the observer, appellant took the sample bottle to the men's room to provide a specimen. A number of irregularities, the significance of which was not then appreciated, ensured. Appellant elected to use a stall, rather than a urinal, complicating Robichaud's observation. He continued to wear his field jacket, and had to be directed by Robichaud to turn slightly so that Robichaud could see him urinate. Even then, as Robichaud later admitted, appellant was positioned in such a way that he did not actually see if appellant urinated, but only that liquid appeared to be filling the bottle. Robichaud, and subsequently the urinalysis monitor, remarked on the clarity of the specimen. However, when asked, appellant explained that he had been drinking a great deal of fluid, and the matter passed. The specimen bottle, which had not left appellant's possession from the time he was given it until he gave it back to the urinalysis monitor, was duly logged, initialed, signed, taped, secured, and mailed to the Armstrong Laboratory at Brooks Air Force Base (AFB) for testing. Once there, one of the laboratory technicians observed that the specimen was colorless, odorless, and did not foam when shaken.

She suspected that a false or adulterated sample had been provided. When a field test indicated that the specimen was not urine, she sent it to Wilford Hall Medical Center, which confirmed that the specimen was not urine, but some sort of saline solution.

Over defense objection, the government introduced evidence that appellant, a medical technician assigned to the

Malcolm Grow Medical Center on Andrews Air Force Base (AFB), had access to intravenous bags containing saline solution, along with surgical tubing and a thumbscrew to control flow from the bags. As well, testimony indicated that appellant was capable of reverse self-catheterizing, replacing the urine in his bladder with a saline solution. Regardless of the specific mechanism employed, it is clear that appellant did not provide a genuine urine specimen as he was required to do.

On learning of the discrepancy in early December, the base looked into the possibility of testing appellant's hair for the presence of drugs. Special Agent (SA) Toni, of the Air Force Office of Special Investigations (AFOSI), contacted the FBI's forensics laboratory, and was advised that the technology existed to test hair based upon the same biomedical and scientific principles as urinalysis. The advantage, he learned, was that hair potentially would continue to show the presence of cocaine for a period of months after ingestion. The FBI agreed to perform the tests. Using an example borrowed for the AFOSI at Langley AFB, Virginia, SA Toni then prepared an affidavit, stating in pertinent part as follows;

4. . . .As a result of your affiant's training and information gathered from the Federal Bureau of Investigation (FBI) forensics laboratory, and the Brooks AFB forensics laboratory, your affiant believes trace amounts of drugs may be trapped in the cortex of BUSH's hail [sic] follicles and in his urine. This is based on the following:

a. As blood circulates through the body, it nourishes the hair follicle. If there are drugs in the blood, trace amounts of the drug become entrapped in the core of the hair in amounts roughly proportional to those ingested. These cannot be washed or flushed out, and do not diminish with time. Urine tests can only determine if drugs have been used within the few days prior to providing a sample, however, hair analysis can detect the use of drugs for months, depending on the length of the hair sample.

b. Hair analysis is not subject to false negatives due to temporary abstention or excessive fluid intake. Hair records drug use in a chronological manner and in proportion to the amount consumed. The FBI laboratory can distinguish between heavy, medium, and light drug users.

5. If drug metabolites are present in BUSH's hairs, at a level in excess of 3 ng/mg of hair, it would indicate repeated use of drugs.

6. Based on all the information provided above, your affiant requests authorization to seize approximately 100 hairs and a urine sample from the body of SSgt MICHAEL W. BUSH.

The search authority, Colonel Moore, swore SA Toni to the affidavit and granted authority to seize "approximately, 100 hairs," but did not authorize seizure of appellant's urine. Pursuant to that authority, approximately 100 hairs were cut from the crown of appellant's head. Although never precisely measured, there was a general consensus that appellant's hair was "quite short," and that the hairs measured approximately 1/2 inch in length. Observing the same chain of custody procedures employed in urinalysis drug testing, the hairs were placed into a bottle, sealed, and sent to the FBI laboratory. By letter of February 28, 1994, the FBI reported that the specimens contained "cocaine and its metabolite, benzoylecgonine at concentrations of 17 and 2.7 nanograms per milligram of hair, respectively."[2]

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[2]Unlike urinalysis, where principally metabolized cocaine (benzoylecgonine) is excreted in urine, unmetabolized cocaine is typically found in hair in five times the amount of its metabolite. According to the testimony of Dr. Donnelly, the government's expert, the 5–1 ratio is typical of actual ingestion, and indeed, "almost precludes any possibility of external contamination." External contamination would yield a much higher ratio. This datum proved significant in the trial itself, as appellant repeatedly suggested that the hair sample might have become contaminated through some kind of passive exposure.

Based upon this evidence, a general court-martial consisting of members convicted appellant, contrary to his please, of dereliction of duty for failure to provide a urine specimen on November 15, 1993, and use of cocaine between on or about Nobember 15, 1993, and January 12, 1994. . . .

* * *

44 MJ at 647–48 (footnote omitted).

I

The first question in this case is whether the military judge erroneously denied the defense motion to suppress the Government's evidence of hair analysis because the tested hair was unlawfully seized from appellant. See generally Mil.R.Evid. 311 (a), Manual for Courts-Martial, United States, 1984, Appellant initially asserts that his hair at the time of its seizure was too short to show drug use at the time he was suspected of using it. Accordingly, he argues that neither the investigating AFOSI agent nor the commander ordering the seizure of his hair could possibly have probable cause to believe evidence of that drug use would still be in his hair. See generally *United States v. Poole*, 30 M.J. 271, 275 (CMA 1990) (probable cause may evaporate with the passage of time). He also asserts that the commander who ordered his hair seized on January 12, 1994, was deliberately or recklessly denied material information that would have dissuaded him from ordering that probable-cause seizure. See generally *Franks v. Delaware*, 438 U.S. 154 (1978). He contends that the investigating officer should have particularly informed the commander that his hair's length as of January 12th, the date of the expected seizure, was scientifically insufficient to determine cocaine use on or about November 15, 1993.

Initially, we note that the record does not support appellant's assertion that probable cause had evaporated

because his hair was only 1/2-inch long on January 12, 1994. In fact, the agent testified that he did not know "exactly how long" appellant's head hair or pubic hair was on January 12, 1994. He estimated that "[i]t would have been at least a half inch. It was probably a half inch to an inch" at the time it was seized. The fact that the hair sample seized was 1/2-inch long does not undermine the investigator's and the commander's practical judgment that a relevant hair sample could still be seized from appellant. See generally Ornelas, — U.S. at —, 116 S.Ct. at 1661 (probable cause is not a legally technical determination but a practicable one).

The initial premise of appellant's second argument is that the investigating police officer was fully aware of the scientific principles upon which hair analysis was based but "deliberately or recklessly" failed to explain those principles to the commander. In addition, he notes that the police investigator did not tell the commander that hair grows 1/2 inch per month and at least 1-inch hair would be required on January 12, 1994, to determine whether appellant used drugs on or about November 15, 1993. He notes further that the police investigator failed to inform the commander that appellant's hair on January 12, 1994, was only 1/2-inch long and would only show drug use on or after December 12, 1993. He contends deliberate deception or reckless disregard for the truth existed in this case, not mere negligence. *See Franks, supra* at 170.

We note that the investigating officer in his supporting affidavit did provide a basic explanation of the scientific principles of hair analysis to the commander. Moreover, he specifically advised the commander:

Urine tests can only determine if drugs have been used within the few days prior to providing a sample, however, hair analysis can detect the use of drugs for months, depending on the length of the hair sample.

Finally, although he admitted that he was aware of the 1/2-inch rule at the time of applying for the search authorization, he asserted that he understood that the hair sample could be taken from the head, public area, or other part of the body. In this context, appellant's deliberate-or-reckless-omission argument is not well taken. See generally *United States v. Figueroa*, 35 M.J. 54, 57 (CMA 1992); *United States v. Colkley*, 899 F.2d 297, 301 (4th Cir. 1990).

This is not a case in which the probable-cause determination required precise mathematical measurements implementing a specific scientific formula. As noted in the findings of fact by the military judge, Agent Toni's guidance from the FBI was rather general in nature:

> The FBI instructed Agent Toni to obtain the longest hair possible, to cut the hair at the base of the scalp. Agent Toni was not told to obtain a certain or minimum length of hair. The FBI told Agent Toni that hair grows approximately one half inch per month and that drugs could possibly remain in the hair for a period as long as three months, depending on the length of hair sample seized and the growth rate.

Moreover, according to the findings of fact by the military judge, after Agent Toni obtained the search warrant—

> Agent Toni subsequently seized about 100 hair samples from the scalp of the accused. The hair was difficult to measure and a measure was not taken after it was cut, because the hair was matted and curly. To the best estimate of Agent Toni, the hair was at least one half inch long to about an inch.

Under these circumstances and in light of the circumstances surrounding the urinalysis which gave rise to the request for a search authorization, it was reasonable for

Agent Toni to proceed under the search authorization without applying a precise mathematical limitation to the length of the hair obtained from appellant.

II

Appellant's basic argument on the second granted issue is that evidence of mass-spectrometry hair analysis was unlawfully admitted at his court-martial to establish his guilt of using cocaine. Citing the decision of the Navy-Marine Corps Court of Military Review* in *United States v. Nimmer*, 39 M.J. 924 (1994), he argues in his 1997 Final Brief to this Court at 17–18, 24, that such evidence is per se inadmissible under Mil.R.Evid. 702. Citing the decision of the Army Court of Criminal Appeals in *United States v. Hill*, 41 M.J. 596 (1994), he contends such evidence is not admissible as the sole proof of drug use at a court-martial. Finally, citing the landmark decision of the Supreme Court in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993), he avers that the military judge abused his discretion in admitting this evidence for the first time in any court in our country.

Appellant first asserts that this Court should decide the question of admissibility of hair-analysis evidence "de novo" and ensure "uniform precedent within the federal system regarding the reliability of particular scientific techniques . . ." Final Brief at 18. He also cites the *Nimmer* decision of the Navy-Marine Corps Court of Military Review and implies that we should follow that court's rejection of hair-analysis evidence ("it lacks the necessary scientific underpinning to reliably be able to detect a one-time use of cocaine. . . ." 39 MJ at 928). Final Brief at 17–18. We reject appellant's invitation to establish a *per se* rule precluding admission of evidence of hair analysis at courts-martial.

The obvious answer to appellant's argument in his 1997 brief is the decision of this Court in *United States v. Nimmer,* 43 M.J. 252 (1995). There, this Court set aside the decision of the service appellate court in *Nimmer* and remanded that case for a hearing on admissibility of hair-analysis testimony in light of *Daubert v. Merrell Dow Pharmaceuticals, Inc., supra.* The *Nimmer* decision relied on by appellant, therefore, has no precedential value, so there is no reason to follow it in this case, especially where a proper *Daubert*-type hearing has been held. In addition, we note that Congress has not provided that this Court make "de novo" admissibility determinations on different types of scientific evidence without regard for evidence of record and a military judge's ruling under Mil. R. Evid. 702. *See United States v. Beasley,* 102 F.3d 1440, 1445 (8th Cir. 1996) (Absent judicial notice of reliability of scientific knowledge, *Daubert* hearing will be held).

We next turn to appellant's argument that hair-analysis evidence is inadmissible if it is used as the sole test to determine cocaine use. Appellant notes evidence in the record that the scientific community only considers hair analysis reliable to corroborate or confirm other evidence of cocaine use. He then cites the Army Court of Criminal Appeals decision in *United States v. Hill, supra,* as generally holding that confirmatory testing evidence is inadmissible at courts-martial if no other evidence shows drug use. Finally, he avers that no other evidence of drug use was admitted in his case and, therefore, the military judge legally erred in admitting the hair-analysis evidence of the Government.

We reject this legal argument for several reasons. First, the Army Court of Criminal Appeals in *United States v. Hill, supra,* addressed the particular question of admissibility of luminol testing to detect human blood, not hair analysis to detect cocaine or its metabolites. The evidence supporting admission of hair-analysis evidence presented in this case was

not before that court, so its decision cannot be considered dispositive of this different question of law. Second, appellant has cited no statute, evidentiary rule, or case law which requires a court to defer to the scientific community's labeling of a test as "confirmatory." We agree with the military judge that Mil. R. Evid. 702 and *Daubert v. Merrell Dow Pharmaceuticals, Inc., supra*, give a military judge broad discretion to regulate admission of scientific evidence at courts-martial with due regard for the advisory opinions of the scientific community. *See United States v. Gipson*, 24, M.J. 246, 252 (CMA 1987). Finally, we agree with the Court of Criminal Appeals in this case that other evidence of drug use was admitted which the hair-analysis evidence corroborated. In particular, the appellate court below noted that evidence was admitted that appellant surreptitiously substituted a saline solution for a urine sample on November 15, 1993. *See generally 2 Wigmore, Evidence Sec. 276 (Chadbourn rev. 1979).*

Appellant finally attacks the decision of the military judge admitting the hair-analysis evidence as an abuse of his discretion provided in Mil. R. Evid. 702. *See generally United States v. Houser,* 36 M.J. 392, 397 (CMA 1993) (to establish abuse of discretion, "appellant must come 'forward with conclusive argument' "). He contends that proper application of the *Daubert* factors to the evidence in his case would lead to the conclusion that hair-analysis evidence is unreliable and inadmissible. These arguments are essentially the same arguments presented to the military judge at trial to prevent admission of the challenged evidence.

The Eighth Circuit in *Beasley,* 102 F.3d at 1447, recently commented on this type of appellate argument:

> In this appeal, Oliver Beasley reasserts his claim that PCR testing does not meet the *Daubert* standard of reliability. He fails, however, to support

> this claim with any fact-based arguments designed to convince us that any of the District Court's findings concerning the reliability of PCR testing are clearly erroneous. Moreover, he does not contend (nor could he plausibly do so) that the District Court failed to follow the method that *Daubert* prescribes for the judicial assessment of the admissibility of scientific evidence. Instead, in his brief he merely incorporates by reference the arguments found in his trial counsel's memorandum in support of the motion to exclude the government's DNA evidence. We reject these arguments. First, they are not properly before us; a litigant cannot make arguments . . . on appeal by incorporating by reference into his appellate brief arguments made in written submissions to the trial court. See 8th Cir. R. 28A(j); *Sidebottom v. Delo*, 46 F.3d 744, 750 n.3 (8th Cir.), cert. denied,—U.S.—, 116 S.Ct. 144, 133 L.Ed.2d 90 (1995). Second, even if these arguments were properly before us, they are not geared to the standard of review, the clear-error standard, that governs our consideration of alleged errors in the trial court's fact-finding.
>
> See Fed.R.Civ.P. 52(a); *Anderson v. City of Bessemer City*, 470 U.S. 564, 573–75, 105 S.Ct. 1504, 1511–12, 84 L.Ed.2d 518 (1985). These arguments thus would be of no assistance to Beasley in persuading us that the District Court's reliability finding regarding the science of PCR testing is clearly erroneous. . ..

We generally agree with the Eighth Circuit that an appellate court of law is not an appropriate place to relitigate a motion to admit expert testimony under Mil. R. Evid. 702. Therefore, we again reject appellant's invitation to determine

de novo the reliability of the hair analysis admitted by the judge in this case. *See United States v. St. Jean*, 45 M.J. 435, 444 (1996) (recognizing abuse-of-discretion standard). As noted by the First Circuit in *United States v. Gonzalez-Maldonado*, 115 F.3d 9, 15 (1997), a judge's decision on admissibility "is entitled to great deference" and an appellate court "will reverse . . .[his] decision on this question only if (1) the . . .[trial judge] based the decision on an incorrect legal standard, or (2) we have a definite and firm conviction that the . . .[judge] made a clear error of judgment in the conclusion . . .[he] reached based on a weighing of the relevant factors." (Internal quotation marks omitted.) See generally *United States v. Houser, supra* (conclusive argument of error).

Turning to appellant's brief, we note that he does not aver that the military judge relied on an incorrect principle of law in deciding to admit the challenged hair-analysis evidence. *See generally United States v. Rouse*, 100 F.3d 560, 568 (8th Cir. 1996). In *United States v Nimmer*, 43 M.J. 252, we remanded the case for a hearing because the military judge did not have the benefit of the *Daubert* decision in determining that hair analysis was inadmissible. Here, individual defense counsel herself called the military judge's attention to the *Daubert* decision, and the military judge expressly referred to it in his written decision. Accordingly, our sole concern in this case is whether appellant has made a conclusive argument that the military judge made a clear error in this case. We are not so persuaded.

Appellant argues that the military judge made a clear error in judgment in determining from the evidence presented in this case that *Daubert* factors show reliable scientific knowledge was established in this case. He notes the *Daubert* factors and states: "[T]he expert testimony in the present case fails to meet the criteria of even one of these factors." Final Brief at 19. He then cites evidence of record supporting his

arguments on the individual factors and concludes that a finding of reliability was not justified in this case.

In particular, appellant first contends that there was overwhelming evidence presented in this case that mass-spectrometry hair analysis was an untested procedure in detecting drug use. He also contends that there was insufficient evidence of peer review and publication because the only article reviewing the technique was written by the FBI laboratory who performed the test. He also avers that there was no evidence admitted showing an error rate for the hair-analysis procedure performed in this case. Finally, he asserts that there was "insufficient and incomplete documentation of the procedures" (Final Brief at 31) of hair analysis used in this case.

The Government delineates in particular detail in its Answer to Final Brief the substantial evidence presented by the prosecution on each of the above *Daubert* factors. We agree with its reading of the record. Admittedly, there was disagreement between the experts presented by the parties with respect to some of the *Daubert* considerations. Nevertheless, we concur with the intermediate appellate court's conclusion that these disputes do not dictate that the evidence of hair analysis be excluded. It said:

> That experts might dispute some particularities of the testing protocol or suggest ways that it could have been improved, or that different controls might be used, or that SOFT [Society of Forensic Toxicologists] might harbor policy concerns about the feasibility of hair analysis for workplace testing, or deem it prudent to have independent corroboration of hair analysis, [sic] even considered in the aggregate, are insufficient bases upon which to exclude the results. A vigorous forensic dialogue between both experts was aptly engaged before the

> triers of fact, who ultimately decided that Dr. Goldberger's reservations about and disagreements with Dr. Donnelly's conclusions were insufficient to raise a reasonable doubt that appellant had used cocaine. Thomas, 43 MJ [626,] at 633 [A.F. Ct. Crim. App. 1995)]. Thus, we hold the military judge did not abuse his discretion in denying appellant's motion in limine and permitting qualitative and quantitative analysis of appellant's hair to go before the court members.

44 MJ at 652 (footnote omitted). In these circumstances, we have no firm and definite conviction that the military judge erred in determining that the proffered hair-analysis evidence was reliable and relevant in appellant's case. (The detailed ruling of the military judge on admissibility is attached as an appendix.)

CONCLUSION

In summary, we conclude that the evidence of mass-spectrometry hair analysis proffered in this case was admissible because the hairs analyzed were lawfully seized from appellant with probable cause. *See Orelas v. United States, supra* (probable cause should be practically, not technically applied). In addition, we conclude that the military judge did not abuse the discretion provided to him under Mil. R. Evid. 702, when based on the record before him he admitted evidence of hair analysis in this case. See generally *United States v. Nimmer,* 43 M.J. 252 (CMA 1995). Such a decision is not unprecedented in Federal law. See *United States v. Medina*, 749 F.Supp. 59 (E.D. NY 1990).

As a postscript, there is some irony to be noted in this case. For years, the military has used urinalysis to prove drug use. See generally *United States v. Ford,* 23 M.J. 331 (CMA

1987); *United States v. Murphy,* 23 M.J. 310. (CMA 1987); *United States v. Harper*, 22 M.J. 157 (CMA 1986). In this case, Staff Sergeant Bush thwarted a urinalysis by surreptitiously substituting a saline solution for a urine sample. The Government has not seized his hair and, by due process proved drug use. This maybe the first drug-use conviction by hair analysis, and it is ironic that Sergeant Bush had a hand in making the Government break new ground in drug detection to catch him.

The decision of the United States Air Force Court of Criminal Appeals is affirmed.

Chief Judge COX and Judges GIERKE and EFFRON concur.

Minority opinion

CRAWFORD, Judge (dissenting):

FACTS

On November 15, 1993, appellant was selected to provide a urine specimen for a random drug-urinalysis test. After appellant provided the sample, the observer, Technical Sergeant Robichaud, noticed that the liquid was relatively clear. Nonetheless, the bottle was sent to the laboratory. On December 1, 1993, test results suggested that the sample was probably a saline solution. Because of the lapse of time, Office of Special Investigations (OSI) agents thought probable cause was lacking to request another urine sample. Special Agent (SA) David Toni interviewed appellant, who denied submitting a false urine sample. An interview with co-workers produced no evidence that appellant had taken illegal drugs.

As an alternative, SA Toni considered testing appellant's

hair samples for drug residue, which could indicate appellant used drugs around November 15, 1993. When SA Toni talked to personnel at the FBI laboratory about hair samples, he was informed that hair grows approximately half an inch per month.

SA Toni then sought a search warrant from the base commander, Colonel Moore. On January 12, 1994, SA Toni submitted an affidavit to Col. Moore in order to obtain the hair sample. The affidavit stated that appellant worked in emergency medical services and had access to saline solution and a dispensing apparatus. Based on this information plus the information concerning the prior urinalysis test, the commander granted SA Toni permission to seize 100 hair samples from appellant's scalp. However, the affidavit made no mention of the amount hair grows per month.

At trial, Dr. Donnelly of the FBI Laboratory, who performed the hair analysis, testified that appellant's hair samples were approximately half an inch in length[1] and established that appellant had "consumed cocaine" because the hair contained 17 nanograms of cocaine per milligram of hair, and 2.7 nanograms of benzoylecgonine per milligram of hair. Appellant sought unsuccessfully to suppress the evidence concerning testing of the hair.

The defense argues that there could not be probable cause to search appellant's hair in January if hair grows half an inch per month. Thus, probable cause to make the seizure would only have existed between November 15 and December 15.

The Government argues that if the agent was incorrect in not informing the magistrate as to the rate of hair growth, the good-faith exception should be applied. The Government notes that the agents did not consider the hair-growth rate when they obtained the warrant.

DISCUSSION

As with many constitutional issues, there is a fundamental structure to doctrinal analysis when examining Fourth Amendment issues. That analysis examines Fourth Amendment coverage[2] and protection.[3] Coverage exists when there is a right to privacy against government agents[4] using any of their senses or mechanical equipment to "observe"[5] areas that are normally considered "private"[6] or interfere with the freedom of movement of a person.[7] Taking blood from an individual[8] or obtaining fingernail scrapings[9] constitutes a Fourth Amendment search. Once it is determined that coverage exists, the next issue is whether there was a violation of Fourth AMendment protections under the warrant requirement or under one of the specifically limited exceptions to the warrant requirement.[10]

The equivalent of a warrant in the military is an authorization by a commander.[11] Such authorization must satisfy the probable-cause[12] and specificity[13] requirements of the Fourth Amendment. The military, unlike some states, does not have a statute addressing how to obtain and identify physical characteristics of a suspect.[14] Thus, this Court must resort to general Fourth Amendment principles. To obtain hair samples from an individual requires reasonable grounds to believe that the hair would assist in a criminal prosecution.[15] The officer's actions may fill in any insufficiency in the authorization.[16] In this instance the search authorization did not designate whether the hair sample should be head hair, body hair, or genital hair. The officer's action will fill in the lack of specificity.[17] After the warrant was obtained, SA Toni focused on head hair. He asked Sergeant Carpenter to obtain approximately 100 hair samples from the crown of appellant's head.

In his affidavit, SA Toni did not tell Col. Moore that appellant's hair was short and that hair grew 1/2 inch per

month. Hypothetically, let us consider that SA Toni was told by an informant that on November 15 Morgan had drugs in his house. In December, the same informant tells SA Toni that the drugs have been removed and sold. However, in January when SA Toni seeks the search authorization from the commander, he does not tell the commander that the drugs were removed in December. It is not necessary for appellant to establish "by direct evidence that the affiant makes an omission recklessly. Rather, it is possible that when the facts omitted from the affidavit are clearly critical to a finding of probable cause, recklessness may be inferred from proof of the omission itself."[18] When there is a reckless omission by a law enforcement officer, the underlying information will be reevaluated as if the correct information had been given.[19] Had that been done in this case, there would be no probable cause to seize hair from appellant's head on January 12, 1994.

Under the circumstances of this case, there were no grounds to believe that the 100 hair samples obtained from appellant's head would have any evidence that related to submission of a fraudulent urine sample on November 15, 1993.

The Government argues that SA Toni was a new agent and was on probationary status and had no training in obtaining hair analysis. The lack of training is not an excuse for failing to know what probable cause would mean in terms of obtaining hair samples.[20] For the good-faith exception to apply, "[a]t the very least, the officer must be familiar with well-established principles" of probable cause.[21] If one were to excuse SA Toni because of lack of training, such excuses would create incentive not to train officers and would undercut the right of privacy of all servicemembers.

For the reasons stated above, I dissent. I would reverse the decision of the Court of Criminal Appeals.

Footnotes

* See 41 M.J. 213, *229 n. * (1994).*

1. "Although never precisely measured, there was a general consensus that appellant's hair was 'quite short,' and that the hairs measured approximately 1/2 inch in length." 44 M.J. 646, *648 (1996).*

2. *United States v. Taylor,* 41 M.J. 168, *170 (CMA 1994)* (Mil. R. Evid. 311 through 317, like the decisions of the Supreme Court, divide Fourth Amendment issues between coverage (that is, when the Fourth Amendment is applicable) and protections.").

In *United States v. Muniz,* 23 M.J. 201, 206–07 (CMA 1987), then-Judge Cox wrote the following:

The Fourth Amendment consists of two main components. The first part refers to the right of the people to be free of unreasonable searches. The second part discusses the circumstances under which warrants may issue. The interrelationship between the two parts has historically been expressed in terms such that searches without a valid warrant are unreasonable, unless they fall within one of the recognized exceptions to the warrant requirement; and the burden is on the Government to show that the search fits within an exception.

3. In *United States v. Rivera,* 10 M.J. 55, 57–58 (CMA 1980), the Court reiterated:

"[S]earches conducted outside the judicial process, without prior approval by judge or magistrate, are per se unreasonable under the Fourth Amendment-subject only to a few specifically established and well-delineated exceptions." *Katz v. United States,* 389 US 247, 357 [88S.Ct. 507, 19 L.Ed.2d 576)] (1967) (footnotes omitted). One well-recognized exception to the requirement that a magistrate or judicial officer must authorize certain searches is found in the

military practice permitting commanding officers or their delegates to authorize searches upon probable cause.

4. See Mil. R. Evid. 311 (c), Manual for Courts-Martial, United States (1995 ed.).

5. This term encompasses all five senses.

6. There is a right to privacy when there is both a subjectively and an objectively reasonable expectation of privacy. *Katz v. United States*, 389 U.S. 347, 361 (1967)(Harlan, J. (concurring)).

7. *United States v. Mendenhall*, 446 U.S. 544 (1980). "[A] person has been 'seized' within the meaning of the Fourth Amendment only if, in view of all of the circumstances surrounding the incident, a reasonable person would have believed that he was not free to leave." *Id.* at 554.

8. *Schmerber v. California*, 384 U.S. 757 (1966).

9. *Cupp v. Murphy*, 412 U.S. 291 (1973).

10. *United States v. Morris*, 28 M.J. 8, *15 (CMA 1989); United States v. Rivera*, 10 M.J. 55, 57 (CMA 1980); see also Mil. R. Evid. 315 (g).

11. Mil. R. Evid. 315 (d).

12. Mil. R. Evid. 315 (f).

13. Mil. R. Evid. 315 (b)(1).

14. *See e.g.*, Sec. 13–3905, Ariz. Rev. Stat.; Vt.R.Crim.P. 41–1.

15. Mil R. Evid. 315 (f).

16. *United States v. Cunningham*, 113 F.3d 289 (1st Cir. 1997)(holding officer's knowledge satisfied specificity requirement); see *United States v. Brown*, 49 F.3d 1162, 1169 (6th Cir. 1995)(holding that executing officer's knowledge "may cure" insufficiencies in warrant).

17. See n 15, *supra*.

18. *Madiwale v. Savaiko*, 117 F.3d 1321, 1327 (11th Cir. 1997), quoting *United States v. Martin*, 615 F.2d 318, 329 (5th Cir. 1980)(holding that "[a] party need not show by direct evidence that the affiant makes an omission recklessly"); *United States v. McNeese*, 901 F.2d 585, 593, 594 (7th Cir. 1990)(citations omitted) (holding that one, by a preponderance of the evidence, "must offer direct evidence of the affiant's state of mind or inferential evidence that the affiant had obvious reasons for omitting facts in order to prove deliberate falsehood or reckless disregard"); *see also United States v. Colkley*, 899 F.2d 297, 301 (4th Cir. 1990). *Cf. United States v. Figueroa*, 35 M.J. 54, 57 (CMA 1992) ("Even if the omission had been intentional or reckless, its inclusion would not have extinguished probable cause."); but *see United States v. Mankani*, 738 F.2d 538, 546 (2d Cir. 1984) (holding search warrant valid because there was "no direct evidence that omissions, if any, were intentionally or recklessly made").

19. See *United States v. LaMorie*, 100 F.3d 547, 555 (8th Cir. 1996); *United States v. Kyllo*, 37 F.3d 526 (9th Cir. 1994); *see also Madiwale v. Savaiko*, 117 F.3d 1321 (11th Cir. 1997); *Martinez v. City of Schenectady*, 115 F.3d 111, 115 (2nd Cir. 1997); *Sherwood v. Mulvihill*, 113 F.3d 396, 400 (3d Cir. 1997).

20. *United States v. Lopez*, 35 M.J. 35, 42 (CMA 1992).

21 See n. 20 *supra*.

APPENDIX B

44 M.J. 646

UNITED STATES

v.

Staff Sergeant Michael W. BUSH, FR247–23–7903,
United States Air Force.

ACM31462

U.S. Air Force Court of Criminal Appeals.

Sentence Adjudged 25 July 1994.

Decided 13 June 1996.

Accused was convicted by a general court-martial, William S. Colwell, J., of unlawful use of cocaine. The United States Air Force Court of Criminal Appeals, Morgan, J., held that: (1) as a matter of first impression, chemical hair analysis was admissible to prove accused's unlawful use of cocaine, and (2) evidence was legally and factually sufficient to support conviction.

Affirmed.

1. MILITARY JUSTICE ⚷ 1052

258A	—
258AV	Evidence and Witnesses
258Ak1049	Bodily Views and Intrusions
258Ak1052	Seizure of bodily fluids.

A. F.Ct.Crim.App. 1996.

Refusal to submit a urine specimen, or submission of a substituted specimen, justified subsequent order to submit a

valid specimen, and subsequent order stood on same legal footing as original; government was not required to produce probable cause for any subsequent search or seizure after accused, by his own misconduct, frustrated inspection for drug use. Military Rules of Evid., Rules 313(b), 315, 316.

2. MILITARY JUSTICE ⚷ 1072.1

258A	—
258AV	Evidence and Witnesses
258Ak1072	Probable Cause Determination
258Ak1072.1	In general.

A. F. Ct . Crim. App . 1996.

Omission of growth rate of hair from special agent's affidavit regarding whether trace amounts of drugs could be trapped in accused's hair follicles was merely negligent and did not serve to undermine probable cause for seizure of accused's hair after his own misconduct frustrated urinalysis inspection.

3. MILITARY JUSTICE ⚷ 1420

258A	—
258AX	Review of Courts-Martial
258AX(B)	Further Review
258AX(B)1	In General
258Akl420	Discretion of military judge.

A. F.Ct.Crim.App. 1996.

Air Force Court of Criminal Appeals reviews military judge's decision to admit or not admit expert testimony on an abuse of discretion standard.

4. MILITARY JUSTICE ⚷ 1120

258A	—
258AV	Evidence and Witnesses
258Akll20	Opinions and expert testimony.

A. F. Ct . Crim. App . 1996.

Chemical hair analysis was admissible in general court-martial to prove accused's unlawful use of cocaine; mass spectrometer analysis of hair samples was accepted as scientifically reliable in relevant community of forensic chemistry, had been subjected to peer review, was subject of growing body of professional publications, studies, and monographs, and could be both probative and helpful to trier of fact. Military Rules of Evid., Rule 702.

5. MILITARY JUSTICE ⚷ 1419

258A	—
258AX	Review of Courts-Martial
258AX(B)	Further Review
258AX(B)1	In General 258Akl419 Scope of review in general.

A. F. Ct . Crim.A~p . 1996.

"Legal sufficiency of evidence" to support conviction is measured by whether, considering evidence in a manner most favorable to prosecution, a reasonable fact finder could have found all essential elements of offenses beyond a reasonable doubt.

See publication Words and Phrases for other judicial constructions and definitions.

6. MILITARY JUSTICE ⚷ 1422

258A	—
258AX	Review of Courts-Martial
258AX(B)	Further Review
258AX(B)1	In General
258Akl 422	Questions of fact.

A. F.Ct.Crim.App. 1996.

"Factual sufficiency of evidence" to support conviction requires that Air Force Court of Criminal Appeals be personally satisfied of accused's guilt beyond a reasonable doubt, allowing for fact that Court is handicapped by sterility of written record.

See publication Words and Phrases for other judicial constructions and definitions.

7. MILITARY JUSTICE ⚷ 787

258A —
258AII Punishable Offenses and Defenses to Charges
258Ak783 Alcohol or Drug Offenses 258Ak787 Evidence.

A. F. Ct. Crim.App. 1996.

Evidence was legally and factually sufficient to sustain conviction for unlawful use of cocaine; hair analysis revealed presence of cocaine in hair shafts, there was expert testimony that presence of cocaine in hair shafts was metabolically explained by ingestion, and that it did not occur as a natural phenomenon, accused's own witness conceded that there was cocaine in the hair sample tested, and chain of custody established that sample to be accused's.

Appellate Counsel for Appellant: Colonel Jay L. Cohen, Lieutenant Colonel Joseph L. Heimann, Major Del Grissom, and Captain Sean A. Sabin.

Appellate Counsel for the United States: Colonel Jeffery T. Infelise and Lieutenant Colonel Michael J. Breslin.

Before PEARSON, SCHREIER, and MORGAN, Appellate Military Judges.

OPINION OF THE COURT

MORGAN, Judge:

This appears to be a case of first impression for federal criminal jurisprudence, where we are asked to decide whether the trial judge erred in admitting chemical hair analysis to support appellant's conviction for the unlawful use of cocaine. We hold that he did not.

On November 15, 1993, appellant was selected to provide a sample for a random drug urinalysis. He showed up at the base theater, as he was directed to do. Thereafter, accompanied by Technical Sergeant (TSgt) Robichaud, the observer, appellant took the sample bottle to the men's room to provide a specimen. A number of irregularities, the significance of which was not then appreciated, ensued. Appellant elected to use a stall, rather than a urinal, complicating Robichaud's observation. He continued to wear his field jacket, and had to be directed by Robichaud to turn slightly so that Robichaud could see him urinate. Even then, as Robichaud later admitted, appellant was positioned in such a way that he did not actually see if appellant urinated, but only that liquid appeared to be filling the bottle. (FN1) Robichaud, and subsequently the urinalysis monitor, remarked on the clarity of the specimen. However, when asked, appellant explained that he had been drinking a great deal of fluid, and the matter passed. The specimen bottle, which had not left appellant's possession from the time he was given it until he gave it back to the urinalysis monitor, was duly logged, initialed, signed, taped, secured, and mailed to the Armstrong Laboratory at Brooks Air Force Base (AFB) for testing. Once there, one of the laboratory technicians observed that the specimen was colorless, odorless, and did not foam when shaken. She suspected that a false or adulterated sample had been provided. When a field test indicated that the specimen was not urine, she sent it to Wilford Hall Medical Center, which confirmed that the specimen was not urine, but some sort of saline solution.

Over defense objection, the government introduced evidence that appellant, a medical technician assigned to the Malcolm Grow Medical Center on Andrews Air Force Base (AFB), had access to intravenous bags containing saline solution, along with surgical tubing and a thumbscrew to control flow from the bags. As well, testimony indicated that appellant was capable of reverse selfcatheterizing, replacing the urine in his bladder with a saline solution. Regardless of the specific mechanism employed, it is clear that appellant did not provide a genuine urine specimen as he was required to do.

On learning of the discrepancy in early December, the base looked into the possibility of testing appellant's hair for the presence of drugs. Special Agent (SA) Toni, of the Air Force Office of Special Investigations (AFOSI), contacted the FBI's forensics laboratory, and was advised that the technology existed to test hair based upon the same bio-medical and scientific principles as urinalysis. The advantage, he learned, was that hair potentially would continue to show the presence of cocaine for a period of months after ingestion. The FBI agreed to perform the tests. Using an example borrowed from the AFOSI at Langley AFB, Virginia, SA Toni then prepared an affidavit, stating in pertinent part as follows:

4. . . . As a result of your affiant's training and information gathered from the Federal Bureau of Investigation (FBI) forensics laboratory, and the Brooks AFB forensics laboratory, your affiant believes trace amounts of drugs may be trapped in the cortex of BUSH's hail (sic) follicles and in his urine. This is based on the following:

a. As blood circulates through the body, it nourishes the hair follicle, If there are drugs in the blood, trace amounts of the drug become entrapped in the core of the hair in amounts roughly proportional to those ingested. These cannot be washed or flushed out, and do not diminish with time. Urine

tests can only determine if drugs have been used within the few days prior to providing a sample, however, hair analysis can detect the use of drugs for months, depending on the length of the hair sample.

b. Hair analysis is not subject to false negatives due to temporary abstention or excessive fluid intake. Hair records drug use in a chronological manner and in proportion to the amount consumed. The FBI laboratory can distinguish between heavy, medium, and light drug users.

5. If drug metabolites are present in BUSH's hairs, at a level in excess of 3 ng/mg of hair, it would indicate repeated use of drugs.

6. Based on all the information provided above, your affiant requests authorization to seize approximately 100 hairs and a urine sample from the body of SSgt MICHAEL W. BUSH.

The search authority, Colonel Moore, swore SA Toni to the affidavit and granted authority to seize "approximately, 100 hairs," but did not authorize seizure of appellant's urine. Pursuant to that authority, approximately 100 hairs were cut from the crown of appellant's head. Although never precisely measured, there was a general consensus that appellant's hair was "quite short," and that the hairs measured approximately 1/2 inch in length. Observing the same chain of custody procedures employed in urinalysis drug testing, the hairs were placed into a bottle, sealed, and sent to the FBI laboratory. By letter of February 28, 1994, the FBI reported that the specimens contained "cocaine and its metabolite, benzoylecgonine at concentrations of 17 and 2.7 nanograms per milligram of hair, respectively." (FN2)

Based upon this evidence, a general court-martial consisting of members convicted appellant, contrary to his pleas, of dereliction of duty for failure to provide a urine

specimen on November 15, 1993, and use of cocaine between on or about November 15, 1993, and January 12, 1994. Appellant now contends that the military judge erred in admitting the hair analysis for two reasons. First, he argues that the seizure of the hairs itself was unlawful because the probable cause (appellant's November 15 substituted urine specimen) preceded by nearly two months the taking of the hair, and second, he argues that hair analysis testing does not pass muster under MIL. R. EVID. 702. Finally, he argues that the evidence was legally and factually insufficient to support his conviction for both charges. We are unpersuaded by appellant's arguments, and affirm.

Seizure of Appellant's Hair

The first prong of appellant's attack on the hair analysis stems from the seizure of the hair itself. It was conceded by both sides at trial that hair grows at approximately the rate of 1/2 inch per month. Hence, appellant continues, hair which was only 1/2 inch long when it was seized nearly two months after the probable cause triggering incident, could not possibly reveal whether he had drugs in his system on November 15, 1993. Where the information which informs a search authorization is stale, appellant concludes, the search authorization is fatally infirm. *See, e.g., United States v. Poole*, 30 M.J. 271, 274 (C.M.A.1990).

[1] Appellant's analysis erroneously presumes that an individual facing a valid, random urine inspection, governed by MIL. R. EVID. 313(b), may by his own misconduct frustrate that inspection and require the government to produce probable cause for any subsequent search or seizure, governed by MIL. R. EVID. 315 and 316. Baldly put, appellant argues that he should profit by the delayed discovery of his subterfuge. That defies common sense, and it is not the law. It is well-settled that the refusal to submit a urine specimen, or

submission of a substituted specimen, justifies a subsequent order to submit a valid specimen, and that the subsequent order stands on the same legal footing as the original. *United States v. Streetman*, 43 M.J. 752 (A.F.Ct.Crim.App.1995) (initial refusal to provide random urinalysis specimen, followed by direct order to do so, did not change requirement into an inadmissible, "command directed" urinalysis); *United States v. Nand*, 17 M.J. 936 (A.F.C.M.R.1984) (submission of tap water for medically required urinalysis, followed by order to provide another specimen; second specimen still qualified as intrusion for valid medical purpose notwithstanding it was also used to screen for drugs); cf., *United States v. Moeller*, 30 M.J. 676 (A.F.C.M.R.), pet. *denied*, 32 M.J. 14 (C.M.A.1990) (entire random urinalysis collection lost in mail, subsequent order to reconduct test not "command directed").

[2] Even if we take the analytical path appellant prefers, his argument fails. Appellant does not deny that his substitution of saline solution for urine provided a reasonable basis from which a search authority could conclude that he might be using drugs, nor does he argue that Colonel Moore's search authorization was itself defective. Instead, he takes aim at the affidavit informing that authorization, contending that the failure of SA Toni to advise the search authority that appellant's hair might not be long enough to provide assurance that drugs taken on or before November 15 would still be found in it was tantamount to a "false statement knowingly or intentionally made or with reckless disregard for the truth" thereby vitiating the good-faith exception of MIL. R. EVID. 311(b)(3). *See also United States v. Figueroa*, 35 M.J. 54, 56 (C.M.A.1992) (omissions of information should be analyzed in the same manner as misrepresentations), *cert. denied*, 507 U.S. 910, 113 S.Ct. 1257, 122 L.Ed.2d 655 (1993).

At worst, the omission of the growth rate of hair in SA Toni's affidavit was merely negligent. (FN3) SA Toni was a new AFOSI agent, still undergoing his first year of probationary training. Not unreasonably, he elected to use a "proven" form of affidavit from another AFOSI office. Further, Colonel Moore authorized him to seize any hair; he was not limited to that on appellant's skull. That he elected the least intrusive sample, ignoring the possibility of longer pubic or body hairs, if anything, redounded to appellant's benefit. In any event, a mere negligent omission will not serve to undermine probable cause. Figueroa, 35 M.J. at 56–7. *See also United States v. Lopez*, 35 M.J. 35 (C.M.A.1992) (failure to mention fact that information provided to search authority was five weeks old not bad faith).

Admissibility of Hair Analysis

[3] [4] We review a military judge's decision to admit or not admit expert testimony on an abuse of discretion standard. *United States v. Nimmer*, 43 M.J. 252 (1995); *United States v. Houser*, 36 M.J. 392 (C.M.A.), *cert. denied*, 510 U.S. 864, 114 S.Ct. 182, 126 L.Ed.2d 141 (1993); *United States v. Thomas*, 43 M.J. 626, 632 (A.F.Ct.Crim.App.1995). On that basis, we hold that the military judge, who made extensive findings of fact and conclusions of law, did not abuse his discretion in admitting the results of appellant's hair analysis.

The admissibility of scientific evidence has, since the watershed case of *Daubert v. Merrell Dow Pharmaceuticals*, Inc., 509 U.S. 579, 113 S.Ct. 2786, 125 L.Ed.2d 469 (1993), provided fecund soil for a proliferation of law review articles, evidentiary analyses, and scholarly comment. We need not add substantially to it here. *Daubert* did no more than apply Federal Rule of Evidence 702, which is identical in all material respects to MIL. R. EVID. 702. With *United States v. Gipson*, 24 M.J. 246 (C.M.A.1987), the Court of Military

Appeals, now the Court of Appeals for the Armed Forces, anticipated the Daubert holding by six years, and established the legal syllogism by which we approach the question of the admissibility of scientific evidence.

Both *Daubert* and *Gipson* sensibly began their analysis by looking to the philosophic undergirding of the appropriate rules of evidence. Rule 402, like its federal counterpart, announces with disarming simplicity that all relevant evidence is admissible except as otherwise declared. This presumption of admissibility reflects the broader policy choice by the drafters that relevant evidence ought to be provided to the trier of fact unless there is good reason not to. This theme carries over to MIL. R. EVID. 702 which, read along with MIL. R. EVID. 401–403, describes a "comprehensive scheme for processing expert testimony." *Nimmer*, 43 M.J. at 255. Rule 702 requires only that "scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue . . .." This relatively liberal rule of admissibility supplants, if it does not eliminate altogether, the "general acceptability" litmus of *Frye v. United States*, 293 F. 1013 (D.C.Cir.1923).

Our most recent guidance from the Court of Appeals for the Armed Forces on scientific or expert testimony, coincidentally, concerns hair analysis. In *Nimmer II* the Court reversed the Navy-Marine Corps Court of Criminal Appeals' published affirmance (*United States v. Nimmer*, 39 M.J. 924 (N.M.C.M.R.1994)) (FN4) of a trial judge's decision to exclude exculpatory hair analysis evidence. The *Nimmer II* majority reasoned that *Daubert*, which had not been decided at the time of Nimmer's trial in 1992, sufficiently enlarged upon the rationale in *Gipson* as to justify remand of the case for further consideration. Tempting as it is, we cannot on that basis conclude (although we may suspect) that the Court of

Appeals for the Armed Forces is persuaded of the legal vitality of hair analysis. Substantive differences between the factual, legal, and even scientific contexts in *Nimmer* and the case *sub judice* necessitate further technical and logical discourse.

Nimmer, who pursuant to urinalysis "barely" tested positive for the metabolite of cocaine, benzoylecgonine, (FN5) sought to introduce evidence of a gas chromatography/mass spectrometry (GC/MS) analysis of a 1 1/2 inch length of his hair which failed to produce any evidence of benzoylecgonine. Technical differences aside, we face an issue which is the logical obverse of that in *Nimmer*. That is, the question of whether the *absence* of benzoylecgonine in a GC/MS analysis of hair reliably tends to prove that the subject didn't use cocaine, is a logically and scientifically discrete question from whether the *presence* of benzoylecgonine or cocaine itself in a tandem stage quadrapole mass spectrometer (MS/MS) analysis of hair reliably tends to prove that the subject did use cocaine. Put another way, it is necessary to separately evaluate the reliability and the validity of hair analysis with reference to the dangers of false positives and false negatives. We are concerned with the former; the *Nimmer* court is concerned with the latter.

There was no dispute between the parties on the major premise of scientific hair analysis, *viz.*, that mass spectrometry analysis of hair could detect the presence of cocaine. *Nimmer II*, 43 M.J. at 257. At trial, the government produced Dr. Brian Donnelly, whom the defense conceded to be an expert in the field of forensic toxicology and hair analysis, and who personally performed the analysis using a state of the art, relatively rare, tandem stage quadrapole mass spectrometry machine. (FN6) The defense produced Dr. Bruce Goldberger, a similarly distinguished forensic toxicologist. Both had

published papers in the professional literature, and both were recognized as among the leading exponents of hair analysis in the Society of Forensic Toxicologists (SOFT). In this sense, it is instructive to note that both agreed on the scientific validity and the reliability of the MS/MS analysis. Nor was there any disagreement about the foundational principle of hair analysis itself. Hair has been analyzed for 50 or 60 years to determine if somebody has been poisoned with, for example, a heavy metal or arsenic. The experts also agreed that cocaine, once ingested, appears in the hair, although uncertainty persists as to how it gets there. The reason that analysis for cocaine in human hair is relatively new is that improved analytical technology, epitomized by the MS/MS, enabled detection, and even quantification, of substances in extraordinarily minute quantities. Appellant's expert did not take issue with the validity of the test. Dr. Donnelly testified that in periodic round robin proficiency tests, the FBI laboratory had done extremely well. As applied to appellant's case, both experts agreed that there was, in fact, cocaine in appellant's hair. Both sides also agreed that a one-time use of cocaine in moderate quantity might not show up, even on a machine as sophisticated, and sensitive, as a tandem quadrapole mass spectrometer.

In fact, although Dr. Goldberger differed at the margins with Dr. Donnelly respecting the internal chain of custody and procedural nuances, and was "uncomfortable" with the application of hair analysis in a criminal context, there was general harmony between the two on the relevant science and the methodology employed in appellant's case. Such disagreement as arose turned chiefly on subtle issues of policy, not science. Nothing in the literature submitted by both parties, or in the testimony of the experts, contradicted that, with proper controls, chain of custody, scientific methodology, and instruments of sufficient sensitivity,

cocaine found in hair is strongly indicative that cocaine was at some point ingested by the subject, and may properly be considered evidence of wrongful use of that drug. *United States v. Thompson*, 34 M.J. 287 (C.M.A.1992). Thus, for all intents and purposes appellant conceded the two principal threshold scientific hypotheses: (a) that cocaine appears in the hair of users; and (b) that scientific analysis using MS/MS (or even GC/MS) instruments can reliably and validly detect that cocaine.

Perhaps the most important source of disagreement between the two lay in the question of passive exposure to the drug, that cocaine found in hair might be explained by other than knowing ingestion. Thus, where the two sides part company is over the final conclusion the government wished the court to draw from Dr. Donnelly's testimony—that appellant wrongfully used cocaine.

To eliminate the passive exposure/contamination hypothesis, Dr. Donnelly first washed the hair samples in a methanol solution, then analyzed the wash for the presence of cocaine. It proved negative. This was a significant datum to both experts, who agreed that if appellant had merely been exposed to cocaine, but had not ingested it, or if his hair sample had been adulterated, that it should have been revealed in the wash. But Dr. Donnelly went farther. According to him, cocaine manifests itself differently in hair than in urine. Because the metabolite benzoylecgonine is a result of the body's hydrolysis of cocaine, one looks primarily for it, as opposed to cocaine itself, in urine. By contrast, unmetabolized cocaine is the dominant substance found in hair analysis. In fact, Dr. Donnelly testified that a ratio of approximately 5–1 of cocaine to benzoylecgonine was strongly indicative of actual ingestion of the drug. (FN7)

In short, the system worked as it was intended. If we may put *Daubert*, *Gipson*, and MIL. R. EVID. 702 in the

vernacular, the judge's first responsibility is to filter from the triers of fact "junk science." Mass spectrometer analysis of hair samples is accepted as scientifically reliable in the relevant community of forensic chemistry, has been subjected to peer review, is the subject of a growing body of professional publications, studies, and monographs, and, most important, can be both probative and helpful to the trier of fact. In short, MS/MS hair analysis is a far cry from palmistry, phrenology or chicken guts, and clears the pseudo-science hurdle easily.

There was more than ample evidence to conclude that the particular tests performed on appellant's sample were scientifically reliable and valid, certainly enough for the military judge to permit testimony to that effect to be given to the triers of fact. According to Dr. Donnelly, the FBI laboratory had never reported a false positive. Having thus passed the threshold of admissibility, the expert testimony was tested, as it should be, in the crucible of trial advocacy, through the presentation of contrary evidence, energetic cross-examination, and careful instruction on the burden of proof. *Daubert*, 509 U.S. at 596, 113 S.Ct. at 2798. Appellant's expert witness conceded, ultimately, that the tests were valid in this case, or at least that there was cocaine in appellant's hair. He also agreed with Dr. Donnelly that, if cocaine were present as the result of either passive exposure or adulteration of the hair sample, he would have expected it to have shown up in the methanol wash. The chain of custody of the hair samples was sound, leaving little or no doubt that the hair samples tested were appellant's.

That experts might dispute some particularities of the testing protocol or suggest ways that it could have been improved, or that different controls might be used, or that SOFT might harbor policy concerns about the feasibility of hair analysis for workplace testing, or deem it prudent to have

independent corroboration of hair analysis, (FN8) even considered in the aggregate, are insufficient bases upon which to exclude the results. A vigorous forensic dialogue between both experts was aptly engaged before the triers of fact, who ultimately decided that Dr. Goldberger's reservations about and disagreements with Dr. Donnelly's conclusions were insufficient to raise a reasonable doubt that appellant had used cocaine. *Thomas*, 43 M.J. at 633. Thus, we hold the military judge did not abuse his discretion in denying appellant's motion in limine and permitting qualitative and quantitative analysis of appellant's hair to go before the court members.

Legal, Factual Sufficiency of the Evidence

[5] [6] [7] Last, appellant challenges the legal and factual sufficiency of the evidence supporting his conviction of both charges. Legal sufficiency is measured by whether, considering the evidence in a manner most favorable to the prosecution, a reasonable fact finder could have found all the essential elements of the offenses beyond a reasonable doubt. *Jackson v. Virginia*, 443 U.S. 307, 309, 99 S.Ct. 2781, 2784, 61 L.Ed.2d 560 (1979). Factual sufficiency requires that we be personally satisfied of the appellant's guilt beyond a reasonable doubt, allowing for the fact that we are handicapped by the sterility of a written record. *United States v. Turner*, 25 M.J. 324 (C.M.A.1987). Even using the least generous view of the government's evidence, we are persuaded of appellant's guilt beyond a reasonable doubt.

After exhaustive effort, appellant's trial defense counsel was unable to shake the chain of custody for the false urine sample. And we need not speculate long as to the possible motivation for appellant to submit a false sample. The government was not obliged to prove how appellant did it, nor did it have to physically observe the manner of its doing. *Somebody* switched the urine samples, and the chain of

custody leads inescapably to the one person who had the motive to do so—appellant.

Turning to the question of cocaine use, the issue of quantification also deserves comment. At trial, appellant's defense counsel challenged the absence of "cut-offs" in Dr. Donnelly's protocol. We must understand Department of Defense "cut-offs" for what they are—scientifically derived, policy-driven figures aimed at minimizing the danger of conviction based upon passive inhalation or some otherwise innocent exposure to a given substance. (FN9) They are not aimed, nor should they be employed, to frustrate the truthfinding process of trial, nor do they substitute for a reasoned application of the Military Rules of Evidence. See *United States v. Johnston*, 41 M.J. 13, 16 (C.M.A.1994) (overruling *United States v. Arguello*, 29 M.J. 198 (C.M.A.1989)). The court in this case benefitted from the learned testimony of experts on both sides of the question. Significantly, despite Dr. Goldberger's criticism of Dr. Donnelly's quantification protocol, he agreed that it was not so defective as to impeach the ultimate conclusion that cocaine appeared in appellant's hair in such fashion and quantity as to impart great confidence that it originated with ingestion. (FN10) Article 112a of the UCMJ does not distinguish between frequent use, nor even one-time use of cocaine. The use of cocaine is prohibited, period.

Like the court members, we are impressed with the rigor, precision, and science of the tandem stage quadrapole mass spectrometry analysis of appellant's hair. There was expert testimony that the presence of cocaine *in* the hair shafts was metabolically explained by ingestion, and that it did not occur as a natural phenomenon. Appellant's own witness conceded that there was cocaine in the hair sample tested, and Dr. Donnelly testified, in response to a question from the court-members, that he was unequivocally certain that the hair he

tested was the sample given him by the AFOSI. In turn, the chain of custody established that sample to be appellant 's. Nor, as appellant seems to suggest, should we ignore the transparent purpose behind appellant's substitution of his urine specimen on November 15, 1993. Accordingly, the findings and sentence are correct in law and in fact, the sentence is appropriate, and the same are hereby

AFFIRMED.

Senior Judges PEARSON and SCHREIER concur.

FN1. Robichaud's decorousness and misplaced trust in appellant earned him a letter of reprimand. Commendably, he was honest about his failure throughout the investigation and the trial. It is heartening, therefore, that he recovered and was subsequently promoted to master sergeant.

FN2. Unlike urinalysis, where principally metabolized cocaine (benzoylecgonine) is excreted in urine, unmetabolized cocaine is typically found in hair in five times the amount of its metabolite. According to the testimony of Dr. Donnelly, the government's expert, the 5–1 ratio is typical of actual ingestion, and indeed, "almost precludes any possibility of external contamination." External contamination would yield a much higher ratio. This datum proved significant in the trial itself, as appellant repeatedly suggested that the hair sample might have become contaminated through some kind of passive exposure.

FN3. We note, in this respect, that at the time SA Toni was completing the affidavit, he did not know how long appellant's hair was. Indeed, he was unsure as to its length even after it was cut. A precise measurement is simply not in the record. Appellant is an African-American, and everyone who handled the hair had some difficulty getting an accurate measurement of its length because of its tendency to curl

tightly back on itself. We accept therefore, the estimate of Dr. Donnelly that the hair was 1/2 inch long.

FN4. For ease in reference, we will refer to the Court of Appeals for the Armed Forces' opinion as *Nimmer II*.

FN5. 151 nanograms per milliliter (ng/m), only 1 ng/ml above the Department of Defense cut-off level for reported positive using the radioimmunoassay (screening) test (RIA) and 51 ng/ml above the cut-off for the gas chromatography/mass spectrometry (GC MS). *Nimmer II*, 43 M.J. at 253.

FN6. MS/MS represents a quantum advance over GC/MS, the system used in most urinalysis cases, and is quite expensive, costing nearly $500,000 each, in comparison to $50,000 to $75,000 for a GC/MS. Very few laboratories in the world have such a machine. The defense expert acknowledged that "MS/MS is a very acceptable tool and it's a fascinating tool for drug testing;" that the FBI was "lucky" to have such a machine.

***653**–FN7. The ratio for appellant was approximately 6 to 1, a figure Dr. Donnelly concluded was consistent with actual ingestion and not passive exposure. The comparatively minute concentration of benzoylecgonine (2.7 ng/ mg), detected only by the most-sophisticated machine available to science, may explain the experts' reluctance to assert that hair analysis, particularly where only the metabolite is screened, is sufficiently sensitive to rule out a one-time use. Dr. Goldberger was less confident in the actual quantification of Dr. Donnelly's results and did not go along with Dr. Donnelly's conclusion that cocaine in the amounts found in appellant's hair was more consistent with regular abuse as opposed to a single instance.

FN8. According to Dr. Goldberger, the consensus of SOFT was that hair analysis drug testing was most

prudentially used as corroborative of some other evidence of illicit drug use. Without accepting that policy admonition for anything more than what it is, we observe that appellant provided ample corroboration in his submission of the phony urinalysis specimen.

FN9. A good analogy would be the legislative decision of various states as to what constitutes legal intoxication. That an individual might have .09% blood alcohol content, and thereby escape a DUI conviction in a state which establishes that .10% blood alcohol content is presumptive for legal intoxication, does not mean that he or she is not "drunk," much less does it mean that he or she did not have anything to drink. Rather, the figure represents a policy judgment, accommodating the variant ability of humans to tolerate alcohol, that .10% represents too much alcohol to drive. The armed forces' zero-tolerance of use of controlled substances means that evidence of knowing ingestion of any amount of such a substance has evidentiary value. As Chief Judge Cox put it, "It is a recognized scientific principle that a sample is positive if it contains any trace of the tested substance, whether that be one kilogram (1000 grams), one nanogram (one billionth of a gram), or a picogram (one trillionth of a gram). It is negative if it contains zero or no trace whatsoever of the tested substance." (*Johnston*, 41 M.J. at 17 (Cox, J. concurring).

FN10. It should be recalled that the quantification of cocaine in hair analysis uses a relationship established by a ratio of mass of cocaine (nanograms) to mass of hair (milligrams). Urinalysis results are expressed by a ratio of mass of cocaine metabolite (nanograms) to volume (milliliters) of urine. It would be unreasonable to expect that these figures would have much relationship to each other. It is also important to note that use of ratios, in conjunction

with the use of deuterated isotopes of cocaine used in Dr. Donnelly's protocol as a positive control, gives a reasonable mathematical assurance of quantitative accuracy.